All-in-one Energy Storage System

User Manual

ROH5542H-05X1P20, ROH5542H-10X2P20

ROH5542H-15X3P20, ROH5542H-20X4P20

ROH5542H-25X5P20, ROH5542H-30X6P20

EN

Contents

Important Safety Instructions

Please keep this manual for future reference.

This manual contains all the safety, installation and operation instructions for the All-in-one Energy Storage System (hereinafter referred to as "Energy Storage System").

1. Explanation of symbols

To ensure the user's safety of personal and property while using this product, relevant information is provided in the manual and highlighted with the following symbols.

Please read the relevant texts carefully when you encounter the following symbols in the manual.

Symbol	Definition
Tip:	Indicates recommendation for reference.
	**IMPORTANT:** Indicates an important reminder during the operation, failure to do so may result in an equipment error alarm.
	**CAUTION:** Indicates a potential risk that could result in equipment damage if not avoided.
	**WARNING:** Indicates a risk of electric shock which will result in damage to equipment or electric shock/injury to personnel if not avoided.
	**WARNING HOT SURFACE:** Indicates a danger caused by high temperature, it may cause burns to personnel if not avoided.
	Read the user manual carefully before any operation.

 **WARNING**	The entire system should be installed and operated by professional and technical personnel!!

2. Requirements for professional and technical personnel

- Professionally trained.
- Familiar with related safety regulations of the electrical system.
- Read this manual carefully and master the related safety instructions.

3. Professional and technical personnel are allowed to

- Install the Energy Storage System to a specified position.
- Conduct trial operations for the Energy Storage System.
- Operate and maintain the Energy Storage System.

4. Safety instructions before installation

IMPORTANT	After receiving the Energy Storage System, please check if there is any damage during transportation. If you find any problem, please contact the transportation company, our local distributor or our company in time.
CAUTION	• When installing or moving the Energy Storage System, please follow the instructions in the manual. • When installing the Energy Storage System, please evaluate whether there is a risk of electric arc in the operation area.
WARNING	Keep the Energy Storage System out of reach of children.

5. Safety instructions for mechanical installation

WARNING	• Before installation, make sure there is no electrical connection to the Energy Storage System. • Ensure enough heat dissipation space for installing the Energy Storage System. Do not install the Energy Storage System in the humid, salt spray, corrosive, greasy, flammable, explosive, dust accumulative or other harsh environments.

6. Safety instructions for electrical connection

CAUTION	• Check whether wiring connections are tight to avoid the danger of heat accumulation caused by loose connections. • The cabinet of the Energy Storage System should be connected to the ground, and the cross-sectional area of the wire connecting the ground terminal to the earth should not be less than $4mm^2$. • A fuse or circuit breaker, whose rated current is twice the rated input current of the Energy Storage System, should be used between the lithium battery and the inverter. • Do not install the Energy Storage System and the lead-acid liquid battery in the closed space. The lead-acid liquid battery generates flammable gas and may cause a fire if the connection terminals spark.
WARNING	• Do not connect the AC output terminal to other power sources or Utility. Otherwise, the Energy Storage System will be damaged. • When the AC output terminal connects to the load, the Energy Storage System needs to stop working.

 **WARNING**	• It is strictly forbidden to connect a transformer or a load with a surge power (VA) exceeding the overload power at the AC output terminal. Otherwise, the Energy Storage System will be damaged. • Both the Utility input and AC output are of high voltage, do not touch the wiring connection to avoid electric shock.

7. Safety instructions for the operation of the Energy Storage System

 **WARNING HOT SURFACE**	When the Energy Storage System is working, it generates a lot of heat and the cabinet temperature is very high, do not touch it and keep it far away from the materials and equipment that are susceptible to the high temperature.
 **CAUTION**	• When the Energy Storage System is working, do not open its cabinet for any operation. • When troubleshooting faults that affect the safety performance of the Energy Storage System or disconnecting DC input, turn off the power switch of the Energy Storage System and wait until the LCD screen is completely off.

8. The dangerous operations that could cause electric arc, fire and explosion inside the Energy Storage System:

- Touch the end of a potentially live cable that has not been insulated;
- Touch the wiring copper busbars, terminals or internal components of the Energy Storage System that might be electriferous;
- The connection of the power cable is loose;
- Screws and other parts accidentally fall inside the the Energy Storage System;
- Incorrect operation by untrained non-professional personnel.

 **WARNING**	Once an accident occurs, it must be handled by professionals. Incorrect operation would cause a more serious accident.

9. Safety instructions for stopping the Energy Storage System

- Firstly, turn off the AC output and disconnect the Utility input, and then turn off the DC switch.
- The internal conductive components should not be touched until the Energy Storage System has been disconnected from the input and output cables for 10 minutes.
- The Energy Storage System does not contain repair parts internally, if you need repair service, please contact our after-sales service personnel.

WARNING	It's dangerous to touch or open the cabinet for maintenance when the equipment is powered off within 10 minutes.

10. Safety instructions for the maintenance of the Energy Storage System

- It is recommended to test the Energy Storage System with testing equipment to ensure there is no voltage at the input terminals or no current on the input and output cables.
- When conducting the electrical connection and maintenance, post a temporary warning sign or put up barriers to prevent unrelated personnel from entering the electrical connection or maintenance area.
- Improper maintenance of the Energy Storage System may cause injury to personnel or damage to the equipment.
- To avoid static damage, it is recommended to wear an anti-static wristband or to avoid unnecessary contact with the circuit board.

CAUTION	The safety mark, warning label and rating plate on the Energy Storage System should be clearly visible, not removed or covered.

11. Safety instructions for lithium battery

- Lithium batteries must be stored separately and stored in outer packaging to avoid mixed storage with other items, open-air storage and high stacking.
- Move the lithium battery in accordance with the required direction, do not place a battery upside down or tilt it to avoid battery collision.
- Before installing lithium batteries, check whether the packaging is intact. Do not use lithium batteries with damaged packaging.
- When installing lithium batteries, please pay attention to the positive and negative poles, do not short circuit the positive and negative poles of a lithium battery.
- When installing lithium batteries, if a battery drops or is hit by a strong impact, it may cause internal damage in the equipment, and it is strictly forbidden to use it, otherwise there will be a safety risk (may be cell leakage, electric shock, etc.).
- After a lithium battery drops, if there is an obvious damage or abnormal odor, smoke, or fire occurs, evacuate the personnel immediately, call emergency services, and contact the professionals. The professionals can use fire extinguishing facilities to extinguish the fire under safety protection.
- After a lithium battery drops, if the appearance is not obviously deformed or damaged, and there is no abnormal odor, smoke, or fire, contact the professionals to transfer the lithium battery to an open and safe place, or contact a recycling company for disposal.
- Do not perform welding or grinding work around lithium batteries to prevent fire caused by electric sparks or arcs.

- Do not use a damaged lithium battery, which may release flammable gas.
- Do not use a lithium battery whose warranty period has expired. If lithium batteries are out of service life, contact a lithium battery recycling company for disposal.
- Dispose of waste lithium batteries in accordance with local laws and regulations. Do not expose waste lithium batteries to direct sunlight, high temperature, high humidity or corrosive substances. Do not dispose of lithium batteries as household waste. Improper disposal of lithium batteries may result in environmental pollution.
- Please use the lithium batteries within the temperature range specified in this manual.
- When the lithium battery temperature is too high, it will cause the battery deformation, damage and electrolyte overflow and the leakage of toxic gases.
- In the case of electrolyte leakage or abnormal odor, avoid contact with the leaked liquid or gas. Please contact the professionals immediately.
- If a fire occurs, the system should be powered off under safety protection. Use carbon dioxide, FM-200 or ABC dry powder fire extinguishers to extinguish the fire.

 **WARNING**	• Do not expose lithium batteries at high temperatures or around heat sources, such as scorching sunlight, fire sources, transformers and heaters. Lithium battery overheating may cause fire or explosion. • To avoid leakage, overheating, fire or explosion, do not disassemble, alter, or damage lithium batteries, for example, insert foreign objects into batteries, or immerse batteries in water or other liquids. • Do not touch battery terminals with other metal objects, which may cause heat or electrolyte leakage.

12. Working environment

- Working temperature range: -20℃ to +50℃ (When the working temperature exceeds 30℃, the charging power and load power will be reduced appropriately. 100% load output is not supported.)
- Storage temperature: -25℃ to +60℃ (No sharp temperature changing)

 **WARNING**	Do not use the Energy Storage System in the following environments, and the company shall not be liable for any damage caused by using it in the inappropriate environments. • Do not install the Energy Storage System in the humid, salt spray, corrosive, greasy, flammable, explosive, dust accumulative or other harsh environments. Avoid direct sunlight and rain infiltration for outdoor installation. • Do not install the Energy Storage System in the closed space with the lead-acid battery. The lead-acid liquid battery generates flammable gas and may cause a fire if the connection terminals spark.

Disclaimers

The warranty does not apply to the following conditions:

- Damage caused by improper use or inappropriate environments (It is strictly forbidden to install the Energy Storage System in the humid, salt spray, corrosive, greasy, flammable, explosive, dust accumulative or other harsh environments).
- The actual current/voltage/power exceeds the limit value of the Energy Storage System.
- Damage caused by working temperature exceeding the rated temperature range.
- Electric arc, fire, explosion and other accidents caused by failure to follow the Energy Storage System labels or manual instructions.
- Unauthorized disassembly and maintenance of the Energy Storage System.
- Damage caused by force majeure such as lightning strikes, rainstorms, mountain torrents and Utility failures.
- Damage occurred during transportation or loading/unloading the Energy Storage System.

1 General Information

1.1 Overview

ROH-H-P20 series is an integrated Energy Storage System that combines lithium battery and off-grid energy storage inverter. With IP20 rating, this product is equipped with 1–6 battery packs as standard configuration (up to 12 battery packs, if the battery pack quantity is more than 6, then customization is needed) and 1 off-grid energy storage inverter. With the energy of 5.12kWh per battery pack, the configuration energy is up to 30.72kWh.

It simultaneously supports multiple Energy Storage Systems (up to 12 units) to expand the application through single phase parallel and three phase parallel, which can output 220VAC for single phase parallel or 380VAC for three phase parallel.

With the power of 5,500W (Note: If selecting the off-grid energy storage inverter of 5,500W, at least 2 lithium battery packs are required for full power running), the off-grid energy storage inverter integrates Utility/oil generators and solar charging, Utility bypass and inverter output, and energy management and control. Adopting advanced DSP control technology to ensure its high quality, stability and reliability. The solar charging adopts optimized MPPT tracking technology, which can track the maximum power point of the PV array in various environments and obtain the maximum energy of the solar panel in real time. It supports two PV inputs (connected separately or connected in parallel) to improve PV utilization. The DC-AC inverter is based on a fully digitalized design and adopts SPWM technology to output pure sine wave, converting DC into AC. Multiple charging modes and AC output modes are optional, and users can use solar energy or Utility flexibly by setting to maximize energy utilization.

The display module adopts a large-size dot-matrix LCD screen, which clearly displays the operating data and status of the system. With standard Modbus protocol communication port, it's convenient for users to expand applications, suitable for different monitoring needs.

With ultra-thin and wall mounted design, the product is space saving. By combining the inverter with different quantities of lithium battery packs, it fully meets the user's demand for high-capacity energy storage power supply.

Features

- A new and fully digital All-in-one Energy Storage System with multiple energy management.
- Modular and stacked design.
- Ultra-thin design to save space.
- Unique wall-mounted installation, easy for maintenance.
- Built-in lithium iron phosphate battery with high cycle stability and long life cycle.
- Pure sine wave output.
- Lithium battery communication port to perform the safe charging and discharging.
- Stable self-activation for lithium batteries.
- Lithium battery charging or discharging current limit to achieve parallel connection of multiple equipment.①
- AC output supports parallel operation (up to 12 units).
- AC output supports single phase and three phase parallel connection.
- PFC technology reduces the demand on the power grid capacity.
- Advanced MPPT technology, with maximum tracking efficiency higher than 99.5%.
- Supports two PV inputs to improve PV utilization.②
- Supports charging from multiple types of generators.③
- Maximum Utility charging current settings to flexibly configure Utility charging power.
- One-button control of AC output.
- Supports soft start.
- Large size LCD display for better monitoring system status in real time.
- With the function of historical data recording, the interval of 15 minutes can be recorded for half a year (the interval time of 1~3600 seconds settable)
- RS485 communication port with optional WIFI, or TCP modules for remote monitoring.
- Comprehensive electronic protections.
- Working temperature ranging from -20℃ to +50℃ to offer a wider scope of application (When the working temperature exceeds 30℃, the charging power and load power will be reduced appropriately. 100% load output is not supported).

① When the battery charging current > 100A, or the cell temperature < 15℃, or the cell temperature > 45℃, it will automatically enter the charging current limiting mode, and the charging current is limited to 20A.

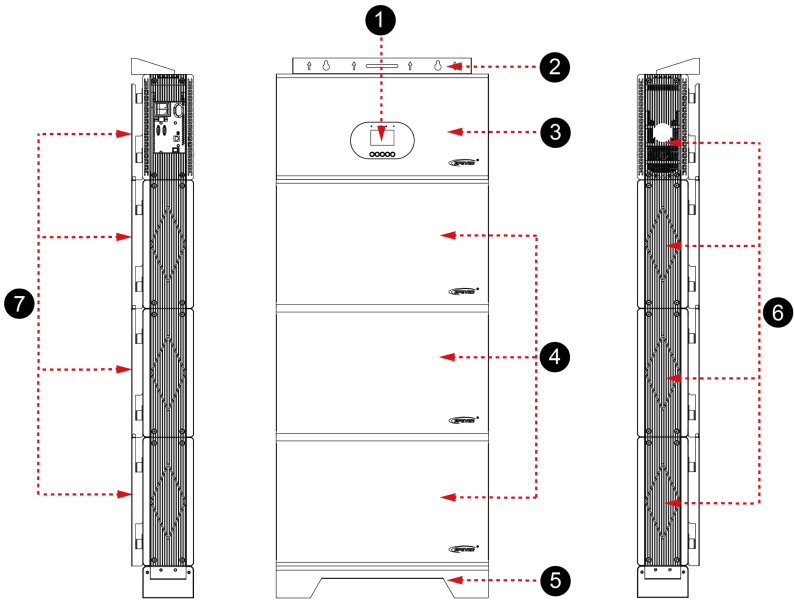
When the battery charging current is < 3A and 18°C ≤ the cell temperature ≤ 42°C, or the charging current limit time exceeds 30 minutes, it will automatically exit the charging current limiting mode.

② The ROH-H-P20 series can achieve single channel and two MPPTs tracking, with the input current ranging from 15A to 30A respectively. When connecting two PV arrays, set the “PV mode” as "ALL SINGLE” when the two PV arrays are independently input; when there are two PV arrays connected in parallel to the Energy Storage System (the PV terminals of the Energy Storage System need to be paralleled externally), set the “PV mode” as "ALL MULTIPLE.” The default mode for the product with only one PV input is “ALL SINGLE” (other modes are invalid).

③ When using a non-variable frequency generator, the charging current cannot reach the rated power, and it is recommended to use a variable frequency generator. And when using the generator, you need to set the AC input to the generator mode, please refer to the chapter 4.5.1 Parameters list for the detailed setting methods.

1.2 Appearance

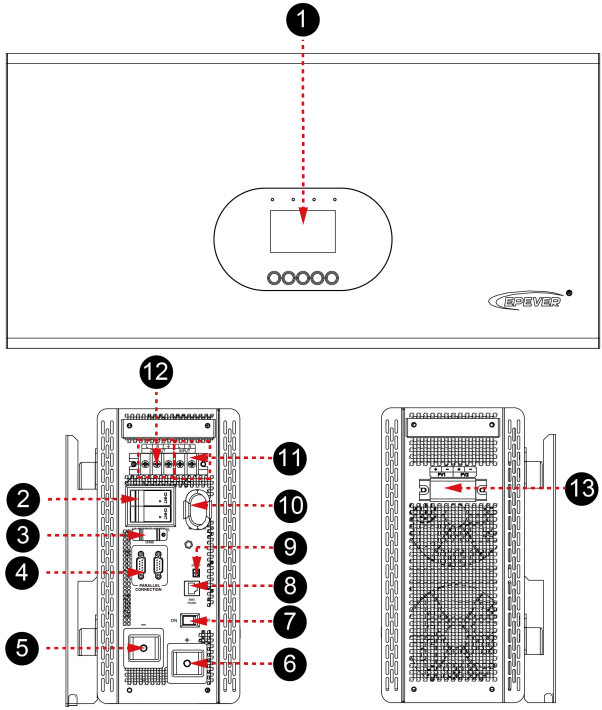
- **Overall**



Note: The product appearance is illustrated above with the ROH5542H-15X3P20 as an example.

No.	Instruction	No.	Instruction
❶	LCD (see chapter 4)	❺	Fixed base
❷	Wall-mounted bracket	❻	Side cover
❸	Inverter (off-grid energy storage inverter)	❼	Wall-mounted support
❹	Lithium battery pack (with optional quantity of 1–12, if the quantity is more than 6, then customization is needed)		

- **The Inverter of the Energy Storage System**

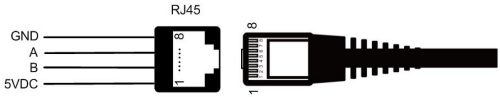


Note: The inverter appearance is illustrated above with the HP5542H-AH1050P20 as an example.

No.	Instruction	No.	Instruction
❶	LCD (see chapter 4)	❽	BMS communication port(2)
❷	AC output circuit breaker	❾	Dry contact port(3)
❸	USB communication port(1)	❿	RS485 communication port (USB-A 3.0, with isolation design)(3) 5VDC/1.2A
❹	Parallel connection port (DB9)	⓫	AC input terminal
❺	Battery negative terminal	⓬	AC output terminal
❻	Battery positive terminal	⓭	PV input terminal
❼	Power switch		

(1) The USB communication port is used for communication between the Energy Storage System and the PC terminal, and for the LCD software upgrades.

(2) The Energy Storage System has a built-in BMS-Link module. Connect the lithium battery pack to the BMS communication port of the inverter directly, which can realize the communication between the inverter and the lithium battery BMS. The pins of the BMS communication port (RJ45) are defined as follows:

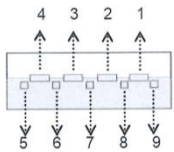


Pin	Definition	Pin	Definition
1	+5VDC	5	RS485-A
2	+5VDC	6	RS485-A
3	RS485-B	7	GND
4	RS485-B	8	GND

(3) Dry contact specification: 1A@250VAC

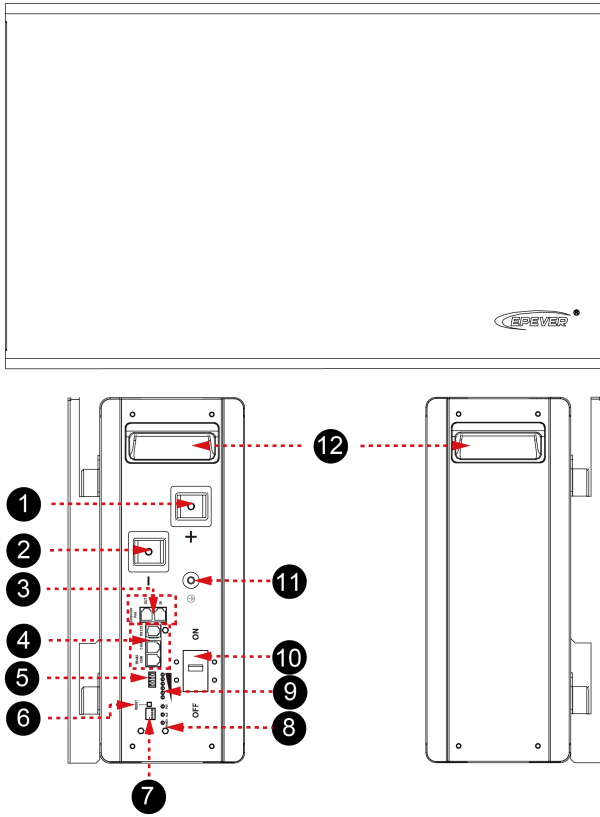
Function: The dry contact port is connected with the oil generator switch in parallel and can turn on/off the oil generator.

(4) Remote monitoring is achieved by connecting the WIFI or TCP modules via RS485 communication port. The pins of the RS485 communication port (USB-A 3.0 female base) are defined as follows:



Pin	Definition	Color	Instruction
1	VBUS	Red	Power (5VDC/1.2A）
2/ 3/ 7/ 8/ 9	Reserved	Reserved	Reserved
4	GND	Black	Power GND
5	RS485-A1	Blue	RS485-A1(to transfer data with cloud platform, APP, PC software, display screen and so on)
6	RS485-B1	Yellow	RS485-B1(to transfer data with cloud platform, APP, PC software, display screen and so on)

- **Lithium battery pack**



Note: The lithium battery pack appearance is illustrated above with the LFP5KWH51.2V-HP20 as an example.

No.	Instruction	No.	Instruction
❶	Battery positive terminal	❼	DIP switch
❷	Battery negative terminal	❽	Battery status indicator
❸	Battery parallel communication port (RJ45 port)	❾	Battery SOC indicator

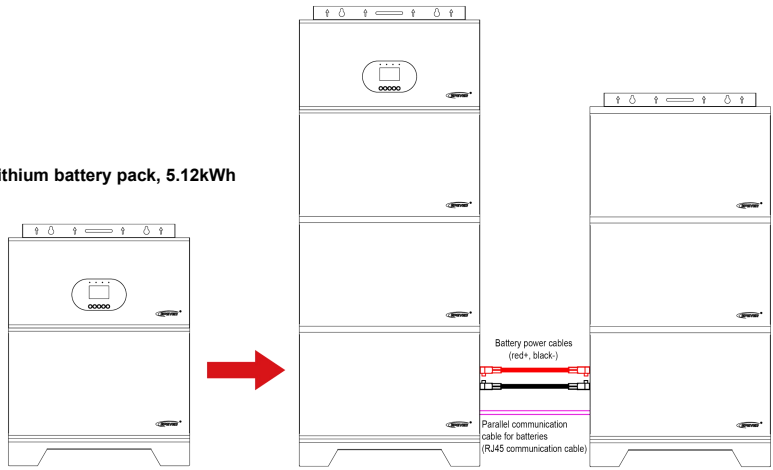
❹	Battery communication port—RS232 port (reserved), CAN port (reserved), RS485 port (for communication between battery and the inverter)	❿	Battery circuit breaker
❺	Dry contact port	⓫	Grounding screw
❻	RESET button	⓬	Battery pack handle

- **Storage energy specification**

The Energy Storage System supports energy expansion ranging from 5.12kWh to 61.44kWh, up to 12 lithium battery packs (equipped with 1–6 lithium battery packs as standard configuration, if the quantity of lithium battery pack is more than 6, then customization is needed).

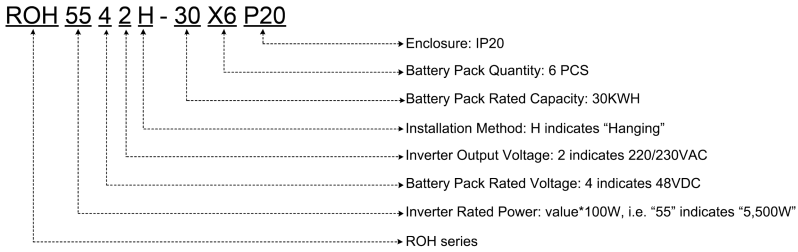
6 lithium battery packs, 30.72kWh

1 lithium battery pack, 5.12kWh



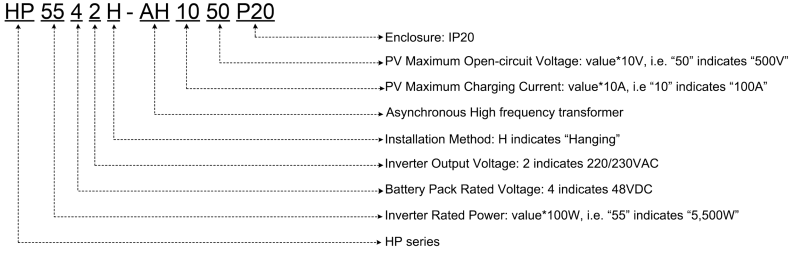
1.3 Naming rules

- **All-in-one Energy Storage System**

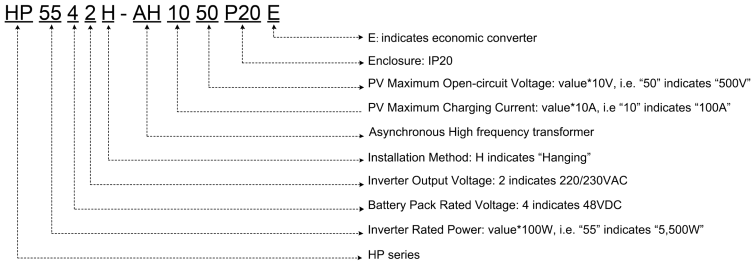


- **Inverter of the Energy Storage System**

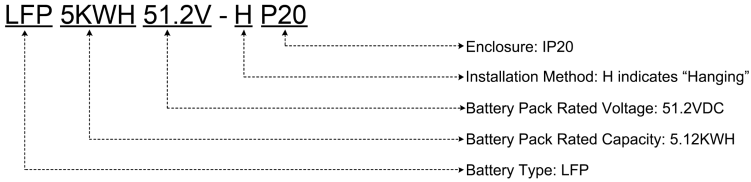
(1) Regular converter

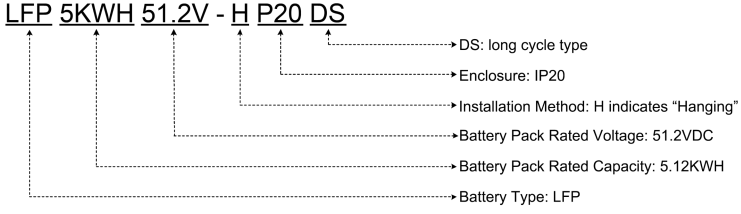


(2) Economic converter

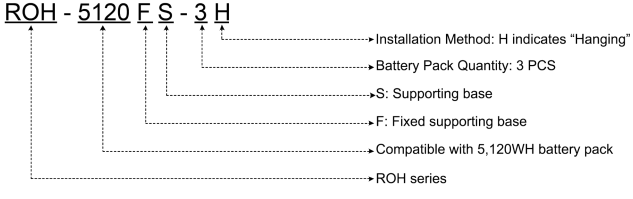


- **Lithium battery**

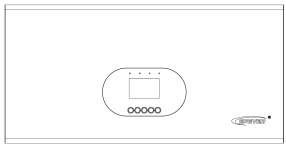
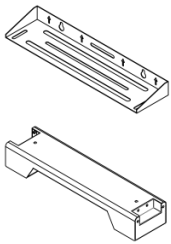
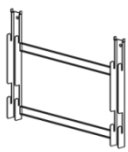
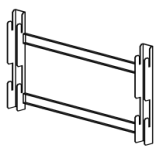




- **Base (included accessory)**

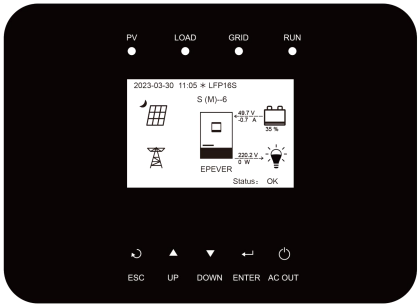


1.4 System components

No.	Name	Picture	Quantity
1	Off-grid energy storage inverter (included accessory)		1 PCS
2	Lithium battery pack (included accessories)		1–3 PCS in parallel (optional quantity)
3	Fixed bracket for lithium battery pack (included accessory)		1 Set
4	Battery mounting bracket (Optional accessories)		Subject to actual parallel quantity
5	Inverter mounting bracket (Optional accessories)		1 PCS

2 LCD Display Interface

- **Interface**



Note: The display screen can be viewed clearly when the angle between the end-user's horizontal sight and the display screen is within 90°. If the angle exceeds 90°, the information on the display screen cannot be viewed clearly.

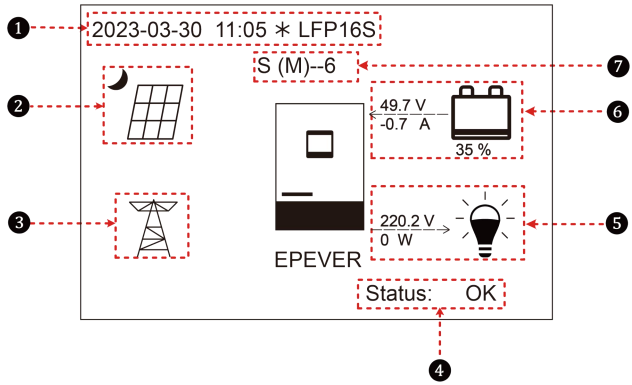
2.1 Indicator

Indicator	Status	Instruction
PV	OFF	No PV input
	Green ON	PV normal
	Red ON	PV charging fault (PV1/PV2 over voltage)
LOAD	OFF	No inverter output
	Green ON	Inverter output normal
	Red ON	Inverter fault (inverter over current/over voltage/under voltage, output short-circuit/over load)
GRID	OFF	No Utility input
	Green ON	Utility normal
	Green flashing (1Hz)	Oil generator charging
	Red ON	Utility charging fault (Utility over voltage/over current/under voltage/frequency abnormal)
RUN	Green flashing (1Hz)	Normal communication
	Red flashing (1Hz)	Communication fault

2.2 Buttons

Buttons	Operation	Instruction
	Click	• Exit the current interface • Switch between the home interface and the "Main Table Data Information" interface.
	Click	• Browsing interface: Up/Down. • Parameters setting interface: Increase or decrease the parameter value per step size.
	Press and hold	Parameters setting interface: Increase or decrease the parameter value per 10 times the step size.
	Click	• Click on the home interface to enter the real-time data interface • Click on the parameter browsing interface to enter the parameter setting interface. • Confirm the setting parameter.
	Press and hold	Press and hold on the home interface to enter the password interface. After verifying the password, enter the parameter browsing interface.
	Click	Click on the time or password setting interface to move the cursor left.
	Press and hold	Press and hold on the home interface to turn on/off the inverter output, the Utility charging, or the Utility bypass.

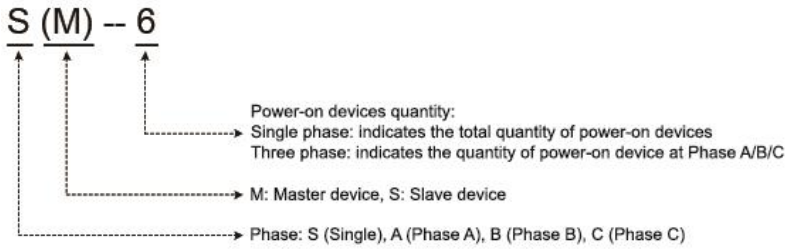
2.3 Home interface



No.	Instruction
❶	Display the system time, current battery type, and charging stage. When the BMS communication is normal, the icon BMS will be shown on the far right, when it is abnormal, the icon BMS will be shown on the same position.
❷	PV icon: PV connection is normal. No PV connection (or at night).
	Actual PV voltage / total PV power
❸	Utility icon: Utility connection is normal. No Utility connection.
	Utility input voltage / Utility input power
❹	Status: When there are no faults, it displays "OK." When faults occur, it displays the minimum fault code. Note: On the home interface, click the "UP/DOWN" button to select the "Status" bar, and click the "ENTER" button to check the fault details..
❺	Load icon: AC output is normal. No AC output.
	AC output voltage / AC output power
❻	Lithium battery status: The lithium battery is discharging. The lithium battery is charging.
	Battery voltage / battery current / lithium battery real-time SOC (display "--" without lithium battery)
❼	Parallel status icon. It shows when two or more Energy Storage Systems connect in parallel successfully, and it will not display on the single Energy Storage System.

Note: When the PV array is charging the battery, the equalizing charging is performed on the 28th of each month by default (the date can be modified).

- **Parallel status icon naming rule:**

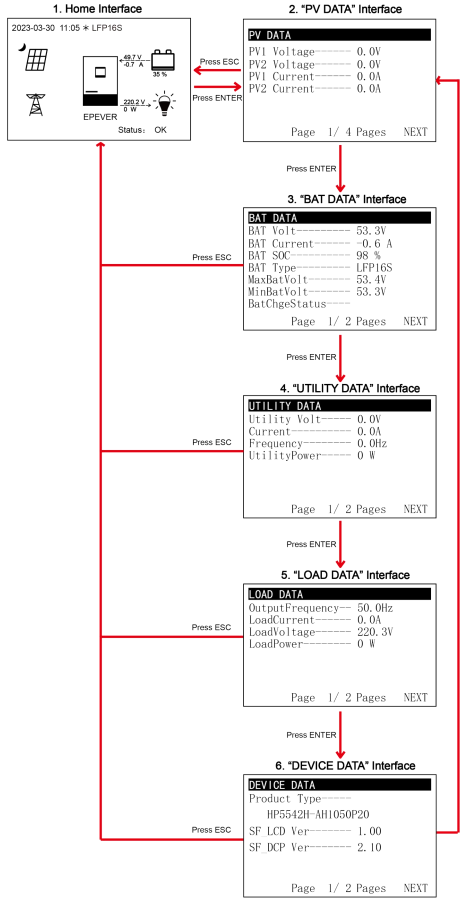


Note: The master and slave devices are randomly defined.

2.4 Interface

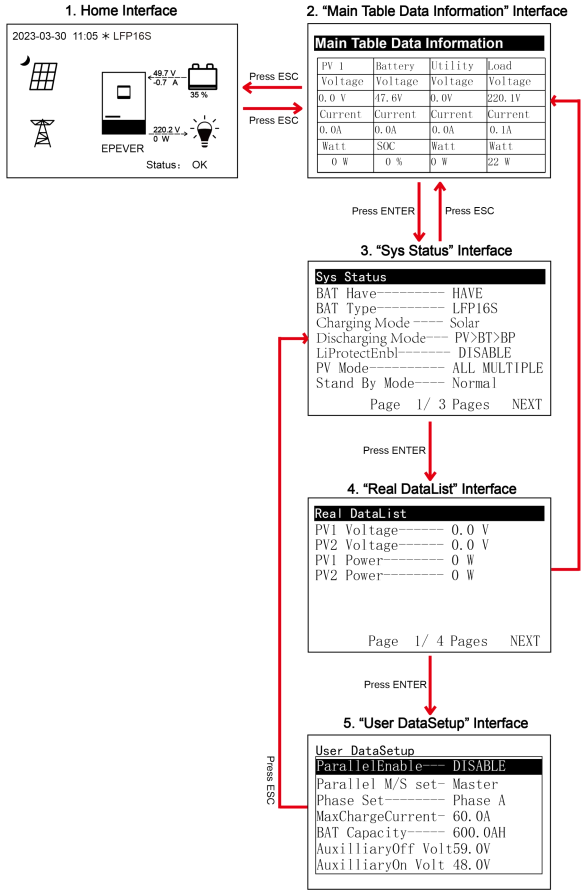
2.4.1 Real-time data interface

After powering on the Energy Storage System, the home interface shows up. Click the "ENTER" button to enter the real-time data interface. Click the "ENTER" button to enter the next real-time interface, click the "UP/DOWN" button to browse all parameters on current interface, or click the "ESC" button to return the home interface.



2.4.2 User interface

After powering on the Energy Storage System, the home interface shows up. Click the "ESC" button to enter the "Main Table Data Information" interface. Click the "ENTER" button to enter the next interface, or click the "UP/DOWN" button to browse all parameters on current interface.

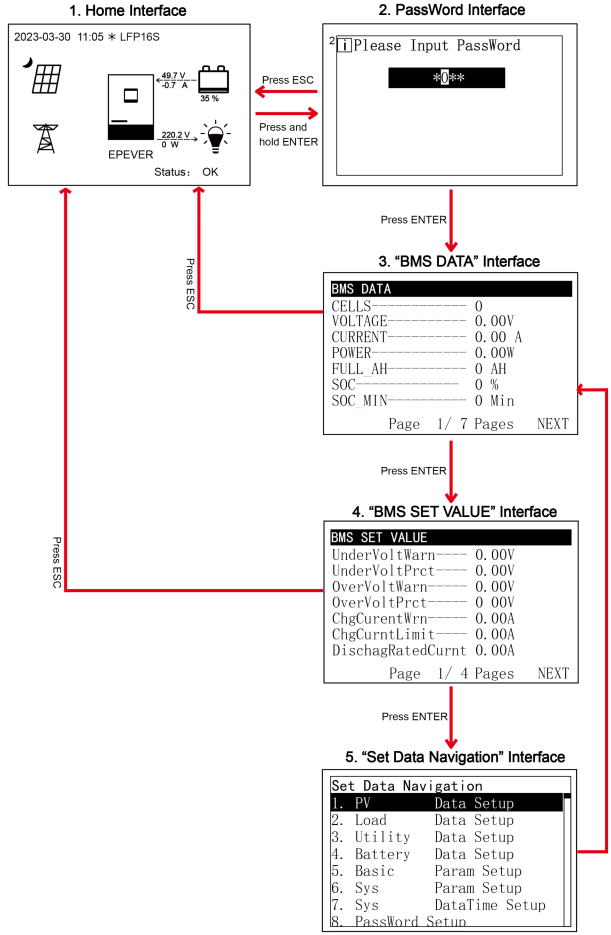


➢ **"User Data Setup" interface**

The end-users can modify common parameters on the "User Data Setup" interface without inputting the password. Please refer to Chapter 4.5.1 Parameters list for default parameters value and setting range.

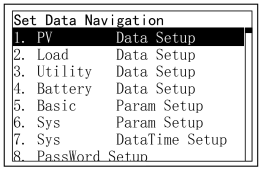
2.4.3 Administrator interface

After powering on the Energy Storage System, the home interface shows up. Press and hold the “ENTER” button to enter the password interface. Input the password 0000 correctly to check all parameters or modify them.



2.5 Parameters setting

2.5.1 Parameters list



Enter the “Set Data Navigation” interface according to the instructions in chapter 4.4.3 Administrator interface. Then click the “UP/DOWN” button to select navigation 1–9 for detailed settings. Default parameters and setting ranges are shown in the following table.

Note: On the parameter setting interface, click the "UP/DOWN" button to increase/decrease the parameter value by one step size (step size is the minimum unit to modify the parameter). Press and hold the "UP/DOWN" button to increase/decrease the parameter value by ten times the step size (Except for “BAT Capacity” and “Log Data Interval”, these values will be increased/decreased by 100 times the step size). Press the “ENTER” button to confirm after the parameter setting is completed.

Parameters	Default	User define
1. PV Data Setup		
UnderVolProtect (PV Under Voltage Protect Voltage)	80.0V	User define: 80.0V to (PV Under Voltage Recover Voltage minus 5V), step size: 0.1V
UnderVoltRecover (PV Under Voltage Recover Voltage)	100.0V	User define: 100.0V to 200.0V or (PV Under Voltage protection plus 5V) to 200.0V, step size: 0.1V Note: Take the maximum value of 100.0V and (PV undervoltage protection point plus 5V).
2. Load Data Setup		
OutputVoltLevel (Output voltage level)	220V	User define: 220V/230V
OutputFrequency (Output Frequency)	50Hz	User define: 50Hz/60Hz Note: when connecting to the Utility and detecting the frequency of the Utility, the output of the Utility bypass status will be in accordance with the Utility frequency. For single Energy Storage System, it will take effect immediately after the output frequency is changed. For the parallel connection, you must shut down the Energy Storage System for 10s and then restart it for the modification to take effect (enter the “Load Data Setup” page again to check if the change has been changed).

Parameters	Default	User define
UnbalanceSet (Current unbalance set)	DISABLE	User define: DISABLE, ENABLE Note: The parameter will only take effect when used in three phase. After performing the “Return FactorySet,” the default value is the last modified value and cannot be restored to the factory value.
Phase Set	Single	User define: Single, Phase A, Phase B, Phase C Note: After “Phase Set” is changed, you must shut down the Energy Storage System for 10s and then restart it. Enter the “Load Data Setup” page again to check if the change has taken effect. After performing the “Return FactorySet,” the default value is the last modified value and cannot be restored to the factory value.
UnbalanceValue (Current unbalance value)	5A	User define：0A to 6,000A，step size: 1A Note: The parameter will only take effect when used in three phase. When “UnbalanSet” is enabled, if current unbalance value between any two phases is higher than set value, the load output will be turned off automatically. After performing the “Return FactorySet,” the default value is the last modified value and cannot be restored to the factory value.
3. Utility Data Setup		
OverVoltDisconect (Utility over voltage disconnect voltage)	265.0V	User define: (Utility over voltage reconnect voltage plus 10V) to 285.0V, step size: 0.1V
OverVoltReconnect (Utility over voltage reconnect voltage)	255.0V	User define: 220.0V to (Utility over voltage disconnect voltage minus 10V), step size: 0.1V
Low Volt Disconct (Utility low voltage disconnect voltage)	175.0V	User define: 90.0V to (Utility low voltage reconnect voltage minus 10V), step size: 0.1V
LowVolt Reconnect (Utility low voltage reconnect voltage)	185.0V	User define: (Utility low voltage disconnect voltage plus 10V) to 220.0V, step size: 0.1V
OverFreqDisconnect (Utility over frequency disconnect)	70.0Hz	In the bypass status, when the actual Utility input frequency is higher than this value, the Energy Storage System will be switched to the inverter output status. User define: 52.0Hz to 70.0Hz, or (Utility under frequency disconnect plus 0.5Hz) to 70.0Hz, step size: 0.1Hz Note: Take the maximum value between 52.0Hz and (Utility under frequency disconnect plus 0.5Hz).

Parameters	Default	User define
UnderFreqDisconct (Utility under frequency disconnect)	40.0Hz	In the bypass status, when the actual Utility input frequency is lower than this value, the Energy Storage System will be switched to the inverter output status. User define: 40.0Hz to 58.0Hz, or 40.0Hz to (Utility over frequency disconnect minus 0.5Hz), step size: 0.1Hz Note: Take the minimum value between 58.0Hz and (Utility over frequency disconnect minus 0.5Hz).
MaxCharge Current (Max. Utility charging current)	100.0A	User define：5.0A to 100.0A, step size: 0.1A i.e. the maximum current at the battery end when the Utility charges the battery.
4. Battery Data Setup		
BAT Set Mode (Battery set mode)	Smart	User define: Smart (see chapter 4.5.3), Expert (see Chapter4.5.4)
BAT Capacity (Battery capacity)	100.0AH	User define: 10AH to 1,200AH, step size: 0.1AH Note: When setting the BAT Capacity, press and hold the "UP/DOWN" button to increase/decrease the value by 100*step size, i.e. 10AH.
EqualizeTime (Battery equalize charging time)	120 Min	User define: 10 minutes to 180 minutes, step size: 1 minute
Boost Time (Battery boost charging time)	120 Min	User define: 10 minutes to 180 minutes, step size: 1 minute
T/C mV/℃/2 (Battery temperature compensate coefficient)	3	User define: 0–9, step size: 1 Note: This option is reserved, which is invalid currently.
AuxiliaryOff Volt (Auxiliary module Off voltage)	56.0V	Under certain working modes, the Utility will stop charging the battery if the battery voltage exceeds this value. User define: (Auxiliary module ON voltage plus (0.2*N) ≤ Auxiliary module Off voltage ≤ Charging limit voltage (N=Rated battery voltage/12), step size: 1V (subject to battery type)
Auxiliary On Volt (Auxiliary module ON voltage)	51.0V	Under certain working modes, the Utility will charge the battery if the battery voltage is lower than this value. User define: Low voltage disconnect voltage ≤ Auxiliary module ON voltage ≤ (Auxiliary module Off voltage minus (0.2*N)) (N=Rated battery voltage/12), step size: 1V (subject to battery type)

Parameters	Default	User define
MaxCharginCurrent (Battery Max. charging current)	100.0A	User define: 5.0A to 100.0A, step size: 0.1A i.e. the maximum allowable charging current at the battery end.
LimitDisChgCurrt (Battery limit discharging current)	250.0A	User define：10.0A to 250.0A, step size: 0.1A i.e. the maximum allowable discharging current at the battery end.
BMS ComStatus (BMS communication status)	164	Read-only, "164 indicates abnormal BMS communication, 165 means normal BMS communication".
ChargeControlMode (Battery charge control mode)	SOC	User define: VOLT, SOC **VOLT:** The battery voltage control parameters take effect after setting “ChargeControlMode” as “VOLT.” **SOC:** The SOC parameters take effect after setting “ChargeControlMode” as “SOC.” Note: If "SOC" is selected, the battery needs to go through several full charging and discharging cycles, and the battery capacity must be set correctly. Before modifying the battery voltage control value, the “BMSVltCntrlEnable” must be set as “DISABLE” first, otherwise, it cannot be modified.
BMS InvalidAction	DSP Auto	User define: DSP Auto, NoAction **DSP Auto:** Running in accordance with the default mode and parameter values of the Energy Storage System. **NoAction:** The Energy Storage System is not charging or discharging and equal to standby mode.
Full Discnnct Soc (Full energy disconnect Soc)	100%	It takes effect after the “ChargeControlMode” is set as “SOC.” When the battery SOC is higher than or equals to this value, the Energy Storage System will stop charging the battery. User define: (Full energy disconnect recover Soc plus 5%) to 100%, or 80%–100%, step size: 1% Note: Take the maximum value between (Full energy disconnect recover Soc plus 5%) and 80%
FulDiscnctRecvSoc (Full energy disconnect recover Soc)	95%	It takes effect after the “ChargeControlMode” is set as “SOC.” When the battery SOC is lower than this value, the Energy Storage System will charge the battery. User define: 60% to (Full energy disconnect Soc minus 5%), step size: 1%

Parameters	Default	User define
LwEngyDisRecvr Soc (Low energy disconnect recover Soc)	40%	It takes effect after the “ChargeControlMode” is set as “SOC.” It cannot be set separately (equals to the "LwEgyDnctRecvrSoc").
UnderEngyAlarmSoc (Under energy alarm Soc)	25%	It takes effect after the “ChargeControlMode” is set as “SOC.” User define: 10%–35%, or 10% to (Low energy disconnect recover Soc minus 5%), step size: 1% Note: Take the minimum value between (Low energy disconnect recover Soc minus 5%) and 35%.
LwEgyDnctRecvrSoc (Low energy disconnect recover Soc)	40%	It takes effect after the “ChargeControlMode” is set as “SOC.” User define: (Under energy alarm Soc plus 5%) to 60%, or 20%–60%, step size: 1% Note: Take the maximum value between (Under energy alarm Soc+5%) and 20%.
LowEngyDiscnctSoc (Low energy disconnect Soc)	10%	It takes effect after the “ChargeControlMode” is set as “SOC.” When the battery SOC is lower than this value, the battery will stop discharging. User define: 0~10%, step size: 1%
UtiltyChargeOnSoc (Utility charging on Soc)	30%	It takes effect after the “ChargeControlMode” is set as “SOC.” User define: 20%–50%, or 20% to (Utility charging off Soc minus 10%), step size: 1% Note: Take the minimum value between 50% and (Utility charging off Soc minus 10%).
UtiltyChargeOfSoc (Utility charging off Soc)	60%	It takes effect after the “ChargeControlMode” is set as “SOC.” User define: (Utility charging on Soc plus 10%) to 100%, or 40%–100%, step size: 1% Note: Take the maximum value between (Utility charging on Soc plus 10%) and 40%.
SOC BAT Capacity (SOC Battery Capacity)	50%	Read-only (After the BMS is connected, this value will read from the BMS)
LimitChgTemp (Limit charge temperature)	0.0℃	When the environment or the battery temperature is lower than this value, the Energy Storage System will stop charging the battery. User define: -20.0℃ to 0℃, step size: 0.1℃
LimitDisChgTem (Limit discharge temperature)	0.0℃	When the environment or the battery temperature is lower than this value, the battery will stop discharging. User define: -20.0℃ to 0℃, step size: 0.1℃

Parameters	Default	User define
BATOverTemp (Battery over temperature protect)	50.0℃	User define: (Battery over temperature protect recover plus 5℃）to 60.0℃，step size: 0.1℃
BATOverTempRecovr (Battery over temperature protect recover)	45.0℃	User define: 30.0℃ to (Battery over temperature protect recover minus 5℃), step size: 0.1℃
Equalize Date	28	User define: 1–28, step size: 1
Manual Equalize	OFF	User define: OFF, ON This parameter is for manual equalizing charging. When set to "ON", the Energy Storage System enters the manual equalizing charging working mode.
ResetSocCalculate (Reset Soc calculate)	--	Press the ENTER button to reset, the SOC will be automatically recalculated.
Reset Self Study AH	--	Press the ENTER button to reset the self study AH.
5. Basic Param Setup		
BAT Have (Battery have or not)	HAVE	User define: HAVE, NO, REV Note: When the parameter value is changed (i.e. the value is changed from “HAVE” to “NO”, or from “NO” to “HAVE”), the Energy Storage System will automatically disconnect its charging and discharging and restart.
Charging Mode	Utlty&solr	User define: Solar, SolarPrior (Solar priority), Utlty&solr (Utility & solar), UtltyPrior (Utility priority). Note: For detailed working modes differences, please refer to chapter 7.Working modes.
Discharging Mode	PV>BT>BP	User define: PV>BP>BT (i.e. PV>Bypass>Battery), PV>BT>BP (i.e. PV>Battery> Bypass), BP>PV>BT (i.e. Bypass>PV> Battery) Note: For detailed working modes differences, please refer to chapter 7.Working modes.
LiProtectEnbl (Lithium battery protection enable)	DISABLE	User define: DISABLE, ENABLE Set this value as "ENABLE," the low temperature limit function is effective.

Parameters	Default	User define
PV Mode	ALL SINGLE	User define: ALL SINGLE, ALL MULTIPLE When two arrays are independently input, the value shall be set to "ALL SINGLE." When two PV arrays are connected in parallel as a single input to the Energy Storage System (the PV terminals need to be paralleled externally), the value shall be set to "ALL MULTIPLE." Product with only one PV input is “ALL SINGLE” by default (other PV modes are invalid).
Stand By Mode	Normal	User define: Normal, Standby When set as "Standby," the Energy Storage System will enter standby mode and the AC output will be stopped. The default value returns to "Normal" after the Energy Storage System is restarted.
EqualizeEnable	DISABLE	User define: DISABLE, ENABLE This parameter is for automatic equalizing charging. Set this value as "ENABLE," the Energy Storage System performs the equalize charging automatically. The default value returns to "DISABLE" after the Energy Storage System is restarted.
ECO Mode	ENABLE	User define: DISABLE, ENABLE When set as "ENABLE," the Energy Storage System will enter the low power consumption mode when certain conditions are met, such as no PV or Utility, and the battery voltage drops to the “Low voltage disconnect voltage.”
Calibration Mode	OFF	User define: OFF, ON Note: This option is reserved, which is invalid currently.
Return FactorySet (Return to the factory settings)	--	Restore factory settings (After setting the "Stand By Mode" as "Standby," the default values for certain parameters can be restored to the factory state). Note: For some parameters, after performing the “Return FactorySet,” the default value is the last modified value and cannot be restored to the factory value. Please refer to parameters setting for more details.
FR (fault reset)	--	Press the “ENTER” button to exit the current fault state and resume normal operation. Note: The historical fault records will not be cleared.
Load Open/Close	OPEN	User define: CLOSE, OPEN This parameter and the load output switch are of the same control. To change the state of either one, the other will be changed too.

Parameters	Default	User define
PVDCInputSource	DISABLE	User define: DISABLE, ENABLE When using a DC power to replace the PV array for power supply testing, it is necessary to set the "PV DC Input Source" as "ENABLE." Otherwise, the Energy Storage System cannot work properly.
ClearAccum Energy (Clear accumulated energy)	--	Press the “ENTER” button to clear all accumulated charging and discharging energy.
DryContactOnVolt (Dry contact ON voltage)	44.0V	When the battery voltage is lower than this value, the dry contact is connected. User define: 0V to (Dry contact OFF voltage-0.1*N), step size: 0.1V. Note: N=Rated battery voltage/12.
DryContactOfVolt (Dry contact OFF voltage)	50.0V	When the battery voltage is higher than this value, the dry contact is disconnected. User define: (Dry contact ON voltage plus 0.1*N) to Over voltage disconnect voltage, step size: 0.1V. Note: N=Rated battery voltage/12.
AC Input mode	Grid	User define: Grid, Generator When the AC input is a generator, this parameter needs to be set to "Generator" to improve the charging capability. Note: If the AC input mode does not match the AC source of the actual input, the normal operation of the Energy Storage System will be affected. After setting, restart the Energy Storage System for the setting to take effect.
BATT Input Mode	Independent	User define: Independent,Shared This parameter takes effect when the Energy Storage Systems are connected in parallel, do not set it randomly.
6. Sys Param Setup		
BackLightTime	30S	User define: 6S, 30S, 60S, Always
BuzzerAlert	ON	User define: OFF, ON If set to "ON," the buzzer will go off when an error occurs and will automatically mute when the error is cleared. If set to "OFF," the buzzer will not go off even if an error occurs.
BckLightOnOff (Back Light On/Off)	ON	User define: OFF, ON Note: “BckLightOnOff” has higher priority than “BackLightTime.”
BaudRate	115200	User define: 115200, 9600, 19200, 38400, 57600
Address	1	User define: 1–254, step size: 1

Parameters	Default	User define
Log Data Interval	60Sec	User define: 1–3600 seconds, step size: 1 second (Note: When setting this value, press and hold the "UP/DOWN" button to increase/decrease the value by 100*step size, i.e. 100 seconds.) Set the time interval of the historical data (only refers to the voltage, current and other data stored regularly, excluding the historical faults. These historical data can be exported by the Solar Guardian PC software or Website.)
Language	ENGLISH	User define: ENGLISH, CHINESE
BlueValid	VALID	User define: INVALID, VALID Note: This option is reserved, which is invalid currently.
Temperature Unit	℃	User define:℃, ℉
BMS Valid/Invalid	VALID	User define: INVALID, VALID Set this value as "VALID," the Energy Storage System will communicate with the battery normally.
BMS Protocol	27	Read only
BMS Com Method	RS485	Read only
Led Switch	OPEN	User define: OPEN, CLOSE Turn on/off the PV/LOAD/GRID/RUN indicators.
BMSVltCntrlEnable (BMS voltage control enable)	ENABLE	User define: DISABLE, ENABLE Set this value as "ENABLE," the BMS internal control parameters will be automatically synchronized to the Energy Storage System, and the Energy Storage System will control the battery charging/discharging based on these parameters.
BMSCurent Select (BMS current control select) (See Chapter 4.5.2 Battery work modes for details.)	BMS	User define: INVALID, BMS, VIRTUAL_BMS Set this value as "INVALID," the Energy Storage System controls the charging and discharging according to the value set on the LCD. Set this value as "BMS," the Energy Storage System controls the charging and discharging according to the read BMS value. Set this value as "VIRTUAL_BMS", the Energy Storage System controls the charging and discharging according to the charging-discharging current value calculated by the MAP table, which is preset in the Energy Storage System.
Log Data Reset	--	Press the “ENTER” button to clear the voltage, current and other data stored regularly, excluding the historical faults. Note: After pressing the “ENTER” button, the flashing LED light will become steady or off. The LCD will automatically restarted when the resetting is completed.

Parameters	Default	User define
BATT Dischage Kx (Batery charging and discharging coefficient)	3C	User define: 1C, 3C This value can be obtained by checking the battery label and is only effective after setting the “BMSCurent Select” as "VIRTUAL_BMS." When this parameter is set to "3C," the Energy Storage System controls the charging and discharging with the maximum limiting current based on the smaller value between “3*BAT Capacity” and the “maximum charging-discharging current value set on the LCD.”
MAP TEMP Select (MAP temperature select)	Default	User define: Default (25 ℃), BMS_ET (BMS environment temperature), BMS_C_MaxT (BMS cell maximum temperature), BMS_C_MinT (BMS cell minimum temperature), RS485, DSP The MAP table calculates the charging and discharging current values based on the temperature and SOC value of the lithium battery. When the lithium battery has BMS function and can upload the temperature value normally. Select “BMS_ET,” “BMS_C_MaxT,” and “BMS_C_MinT” based on the uploaded value by lithium battery (These three parameter are only effective after setting the “BMSCurent Select” as "VIRTUAL_BMS." When the lithium battery only has a protection board, it recommended to set “MAP TEMP Select” as “RS485” (A smart remote temperature sensor is needed). Otherwise, select "default (25 ℃).” “DSP” indicates the default temperature of the Energy Storage System.
Manual charge control	ENABLE	User define: ENABLE, DISABLE Under normal BMS communication, if the “Manual Charge Control” is set as “ENABLE,” it indicates lithium battery charging is allowed; when setting the “Manual Charge Control” as “DISABLE,” it indicates lithium battery charging is prohibited.
7. Sys DataTime Setup (See chapter 4.5.5)		
8. Password Setup (See chapter 4.5.6)		
9. Bat Control Data Setup (This will take effect when setting the "BAT Set Mode" as "Smart.")		
BAT Set Mode (Battery set mode)	Smart	Read-only
Level	48V	Read-only
Battery Type	LFP16S	Read-only

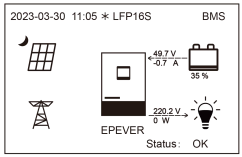
Parameters	Default	User define
BoostCharginVolt (Boost charging voltage)	57.1V	Read-only The Energy Storage System automatically assigns control voltage subject to the selected battery type, and the values cannot be modified.
FloatChagingVolt (Float charging voltage)	54.4V	
LowVoltReconect (Low voltage reconnect voltage)	52.0V	
LowVoltDisconect (Low voltage disconnect voltage)	46.4V	
9. Bat Control Data Setup (This will take effect when setting the "BAT Set Mode" as "Expert" first)		
BAT Set Mode (Battery set mode)	Expert	Read-only
Level	48V	Read-only
Battery Type	LFP16S	Read-only
OverVoltDiscnect (Over voltage disconnect voltage)	59.2V	User define: Charging limit voltage < Over voltage disconnect voltage ≤ 16*N, step size: 0.1V Note: N=Rated battery voltage/12.
ChargingLimitVolt (Charging limit voltage)	58.4V	User define: Equalize charging voltage < Charging limit voltage < Over voltage disconnect voltage, step size: 0.1V
OverVoltReconect (Over voltage reconnect voltage)	58.4V	User define: 9*N ≤ Over voltage reconnect voltage < (Over voltage disconnect voltage - 0.1*N), step size: 0.1V Note: N=Rated battery voltage/12.
EqualizeChagVolt (Equalize charging voltage)	57.1V	User define: Boost charging voltage ≤ Equalize charging voltage ≤ Charging limit voltage, step size: 0.1V
BoostCharginVolt (Boost charging voltage)	57.1V	User define: Float charging voltage ≤ Boost charging voltage ≤ Equalize charging voltage, step size: 0.1V

Parameters	Default	User define
FloatChagingVolt (Float charging voltage)	54.4V	User define: Boost voltage reconnect voltage < Float charging voltage ≤ Boost charging voltage, step size: 0.1V
BoostRecnectVolt (Boost voltage reconnect voltage)	53.3V	User define: Low voltage reconnect voltage < Boost voltage reconnect voltage < Float charging voltage, step size: 0.1V
LowVoltReconect (Low voltage reconnect voltage)	52.0V	User define: Low voltage disconnect voltage < Low voltage reconnect voltage < Boost voltage reconnect voltage, step size: 0.1V
UndrVltWarnRecvr (Under voltage warning recover voltage)	51.2V	User define: (Under voltage warning voltage + 0.1*N) < Under voltage warning recover voltage ≤ Low voltage reconnect voltage, step size: 0.1V Note: N=Rated battery voltage/12.
UnderVolt Warn (Under voltage warning voltage)	49.6V	User define: Discharging limit voltage ≤ Under voltage warning voltage < (Under voltage warning recover voltage-0.1*N), step size: 0.1V Note: N=Rated battery voltage/12.
LowVoltDisconect (Low voltage disconnect voltage)	46.4V	User define: Discharging limit voltage ≤ Low voltage disconnect voltage < Low voltage reconnect voltage, step size: 0.1V
DischrgeLimitVolt (Discharging limit voltage)	44.0V	Read-only

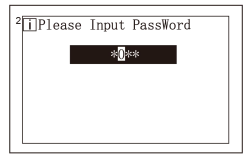
Note: Except for some parameters (such as “OutputFrequency,” “Phase Set,” “Return FactorySet” and “AC Input mode”), which require to restart the Energy Storage System for the modification to take effect. The rest of the parameters take effect immediately after modifying without restarting the Energy Storage System.

2.5.2 Battery work modes

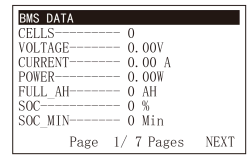
When the system adopts a lithium battery pack with BMS and current control function at the end of charging and discharging, and the lithium battery pack can communicate with the Energy Storage System normally, follow the flowchart below to set parameters correctly. The Energy Storage System controls charging and discharging based on the read BMS values when the parameter setting is completed.



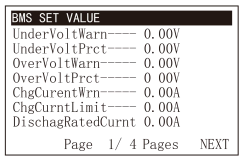
1. Press and hold “ENTER” button on the home interface to enter the password input interface.



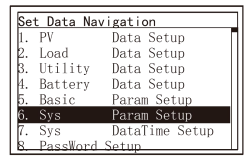
2. Input the correct password and press “ENTER” button.



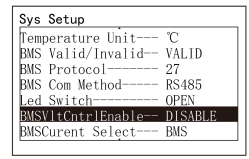
3. Enter “BMS DATA” interface.



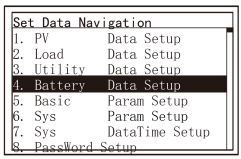
4. Press “Enter” button again to enter “BMS SET VALUE” interface.



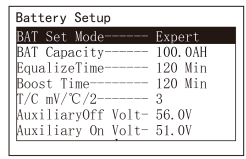
5. Press “Enter” button for the last time to enter “Set Data Navigation” interface. Press “UP/DOWN” button to select “Sys Param Setup,” then press “ENTER” button.



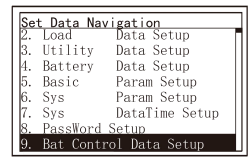
6. On the “Sys Setup” interface, press “UP/DOWN” to select “BMSVltCntrlEnable.” Press “ENTER” button to enter parameter setting interface and set it as “DISABLE.”



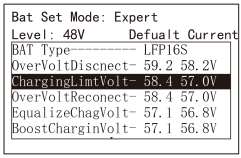
7. Press “ESC” button to return to “Set Data Navigation” interface. Press “UP/DOWN” button to select “Battery Data Setup,” then press “ENTER” button.



8. On the “Battery Setup” interface, set the “BAT Set Mode” as “Expert.”



9. Press “ESC” button to return to “Set Data Navigation” interface. Press “UP/DOWN” button to select “Bat Control Data Setup”, then press “ENTER” button.

<table>
<tr>
<td> 
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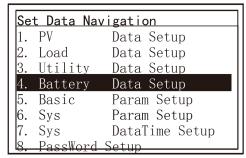
<td> 
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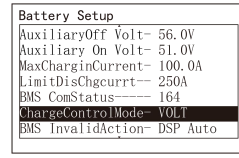
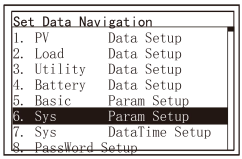
<td> 
</td>
</tr>
<tr>
<td>10. Modify the voltage control values based on the actual situation.</td>
<td>11. After parameter setting is completed, press “ESC” button to return to “Set Data Navigation” interface. Press “UP/DOWN” button to select “ Battery Data Setup,” then press “ENTER” button.</td>
<td>12. Press “UP/DOWN” button to select “ChargeControlMode.” Press “ENTER” button to enter parameter setting interface and set it as “VOLT.”</td>
</tr>
<tr>
<td> 
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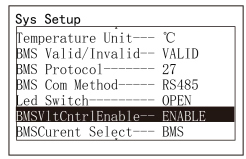
<td> 
</td>
<td></td>
</tr>
<tr>
<td>13. Press “ESC” button to return to “Set Data Navigation” interface. Press “UP/DOWN” button to select “Sys Param Setup,” then press “ENTER” button.</td>
<td>14. Press “UP/DOWN” button to select “BMSVltCntrlEnable.” Press “ENTER” button to enter parameter setting interface and set it as “ENABLE.”</td>
<td></td>
</tr>
</table>

CAUTION	● The Energy Storage System will control charging and discharging based on the LCD settings after setting the “BMSCurent Select” as “INVALID,” or the communication between battery and Energy Storage System fails. ● The Energy Storage System controls charging and discharging based on the pre-set MAP table after setting the “BMSCurent Select” as “VIRTUAL_BMS.”

2.5.3 Battery voltage control parameters (Smart)

After setting the "BAT Set Mode" as "Smart," the battery voltage control parameters cannot be modified. The Energy Storage System will automatically assign values to all battery voltage control parameters according to the selected battery type. To modify them, set the "BAT Set Mode" as "Expert" first.

2.5.4 Battery voltage control parameters (Expert)

After setting the “BAT Set Mode” as “Expert”, all battery voltage control parameters can be modified.

Battery type / Voltage control parameters	LFP16S	User define
OverVoltDiscnect (Over voltage disconnect voltage)	59.2V	42.8–64V
Charging limit voltage	58.4V	42.8–64V
OverVoltReconect (Over voltage reconnect voltage)	58.4V	42.8–64V
Equalize Charging Voltage	57.1V	42.8–64V
Boost Charging Voltage	57.1V	42.8–64V
Float Charging Voltage	54.4V	42.8–64V
Boost Voltage Reconnect Voltage	53.3V	42.8–64V
LowVoltReconect (Low voltage reconnect voltage)	52.0V	42.8–64V
Under Voltage Warning Recover Voltage	51.2V	42.8–64V
Under Voltage Warning Voltage	49.6V	42.8–64V
LowVoltDisconect (Low voltage disconnect voltage)	46.4V	42.8–64V
Discharging Limit Voltage	44.0V	Fixed value

When setting the lithium battery voltage control parameters, the following rules must be obeyed.

A. Over Voltage Disconnect Voltage < Over Charging Protection Voltage (BMS Circuit Protection Modules) minus 0.2V

B. Over Voltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Voltage Reconnect Voltage

C. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage

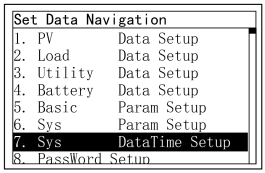
D. Boost Voltage Reconnect Voltage > Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage

E. Under Voltage Warning Recover Voltage > Under Voltage Warning Voltage ≥ Discharging Limit Voltage

F. Low Voltage Disconnect Voltage ≥ Over Discharging Protection Voltage (BMS Circuit Protection Modules) plus 0.2V

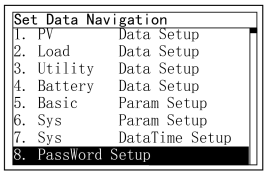
CAUTION	The voltage control accuracy of BMS circuit protection module must be at least ±0.2V. The “Over Voltage Disconnect Voltage” shall be lower than the protection voltage of the BMS circuit protection module. In contrast, the “Low Voltage Disconnect Voltage” shall be higher. The increased voltage of the “Over Voltage Disconnect Voltage” and the “Low Voltage Disconnect Voltage” is determined by the control accuracy of the BMS circuit protection module.

2.5.5 Time setting



Enter the "Set Data Navigation" interface according to chapter 4.4.3 Administrator interface. Then press "UP/DOWN" button to select "7. Sys DataTime Setup", and press "ENTER" button to enter the system time setting interface. On the system time setting interface, press "ENTER" button to move right, press "AC OUT" button to move left, and press "UP/DOWN" button to adjust the value. After the time setting is completed, move the cursor back to the first digit and click "ENTER" button to confirm. The system time will be updated if the setting value is within the range.

2.5.6 Password modifying



Enter the "Set Data Navigation" interface according to chapter 4.4.3 Administrator interface. Then press "UP/DOWN" button to select "8. PassWord Setup", and press "ENTER" button to enter the password modifying interface. On the password modifying interface, press "ENTER" button to move right, press "AC OUT" button to move left, and press "UP/DOWN" button to adjust the value. After the time setting is completed, move the cursor back to the first digit and click "ENTER" button to confirm.

Note: The default password is "0000", which is set to prevent non-professional operations. Please memorize the new password after modifying it. If forgetting the password, press and hold "AC OUT" button on the password input interface, the password will be automatically reset to "0000."

3 Installation

3.1 Attention

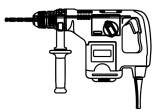
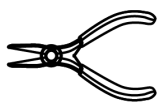
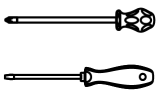
Please read the manual carefully to familiarize yourself with the installation steps.

- Before unpacking, check the outer packaging for visible damage such as holes, cracks, or other signs of possible internal damage, and check the equipment model. If there is any packaging defect or the equipment model is not what you requested, do not unpack the product and contact your dealer as soon as possible.
- After unpacking, check if the deliverables are intact and complete, and free from any obvious external damage. If any item is missing or damaged, contact your dealer.
- The installation and usage environment must meet relevant international, national, and local standards for lithium batteries, and are in accordance with the local laws and regulations.
- Ensure that the equipment is installed in a dry and well ventilated area and is protected from dust and condensation.
- Install the equipment in a sheltered place or install an awning over it to avoid direct sunlight or rain.
- Do not install the equipment around flammable and explosive materials.
- Install the equipment at least 2 meters away from the heat source.
- Keep the installation out of reach of children and away from daily working or living areas.
- Ensure the environment around the installation is clean and free from large amounts of infrared radiation, organic solvents and corrosive gases.
- For areas prone to natural disasters such as floods, debris flows, earthquakes and typhoons, take corresponding precautions for installation.

WARNING	• Before installation, make sure there is no electrical connection to the Energy Storage System. • Risk of explosion! Do not install the Energy Storage System and the lead-acid liquid battery in the same enclosed space, or in an enclosed place where the battery gas may accumulate either! • Do not install the Energy Storage System at forward tilted, back tilted, side tilted or upside down positions. • Do not install the Energy Storage System in the humid, salt spray, corrosive, greasy, flammable, explosive, dust accumulative or other harsh environments. • If the ambient temperature exceeds the working range of the lithium batteries, the lithium batteries will stop working. Lithium batteries working temperature range:

	0℃ to +50℃ for charging; -20℃ to +50℃ for discharging (the optimal working temperature is 25±2℃). Frequent exposure to extreme temperatures may reduce the performance and life of lithium batteries.
CAUTION	• Keep the lithium battery away from any metal objects, which may cause a short circuit of the lithium battery. • Ensure that the surrounding environment is well ventilated. • Ensure enough heat dissipation space when installing the Energy Storage System. • When the Energy Storage System is working, it generates a lot of heat, and the cabinet temperature is very high. Please do not touch it, and keep it far away from the materials and devices that are susceptible to the high temperature. • When moving heavy objects, you should be prepared for load-bearing to avoid being crushed or sprained.  < 18kg (< 40lbs) 18kg–32kg (40lbs–70lbs) 32kg–55kg (70lbs–121lbs) > 18kg (> 121lbs) • When moving the equipment by hand, wear protective gloves to avoid injury.

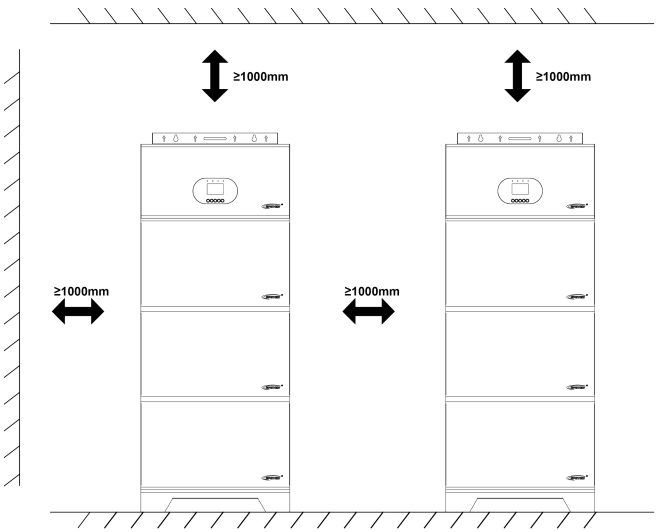
3.2 Prepare installation tools

Type	Installation and protective tools		
Installation			
			
			

Type	Installation and protective tools		
Personal protective equipment			
		 	 

3.3 Determine the installation position

During installation, ensure that there are no other devices, flammable or explosive materials around the Energy Storage System. Reserve adequate space for heat dissipation and safety isolation (There should be at least 1,000mm of space left above and on the left and right sides of the Energy Storage System).



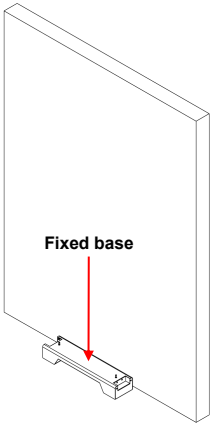
3.4 Install the Energy Storage System

The following installation process is illustrated using the 15.36kWh Energy Storage System as an example. The installation method for other Energy Storage Systems of different energy is the same, for example, with 1 lithium battery pack for the 5.12kWh Energy Storage System, with 2 lithium battery packs for the 10.24kWh Energy Storage System, and 6 batteries packs for the 30.72kWh Energy Storage System.

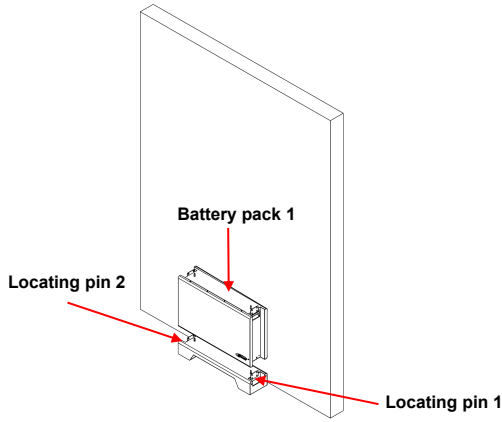
 **WARNING**	Breaking torque of installing the Energy Storage System: M8 ≥ 12N.M, M3 ≥ 1.2N.M

- Install by fixed base (included accessories)

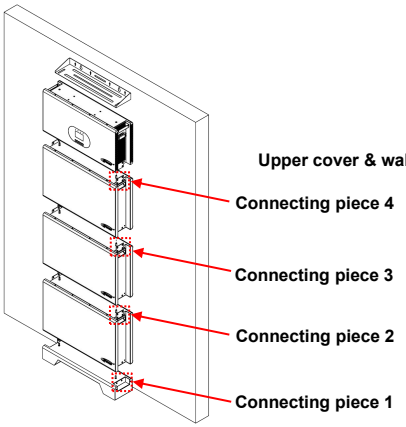
❶ Place the fixed base on a level floor and close to a wall that meets the installation requirements.



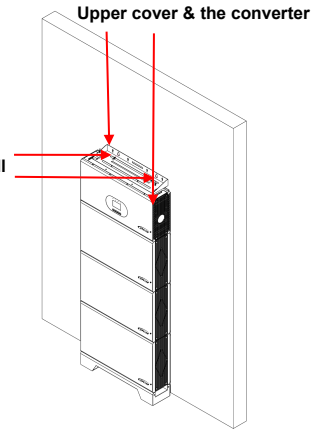
❷ Align the first battery pack with the locating pins and place it on the fixed base.



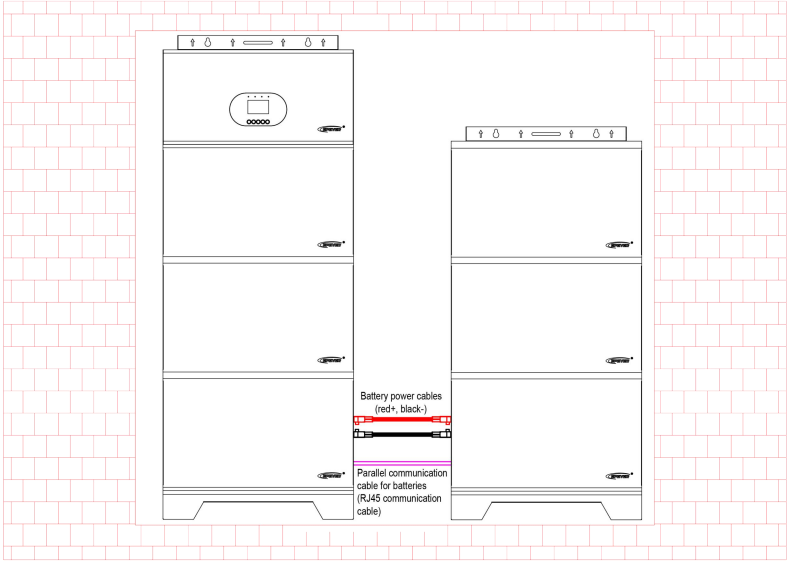
❸ Stack the rest battery packs and the inverter in sequence on the fixed base, tighten the connecting pieces on the side with screws.



❹ Fix the upper cover and wall with 2PCS M8*50 expansion bolts, and fix the upper cover and the inverter with 2PCS M8*16 hexagonal screws .

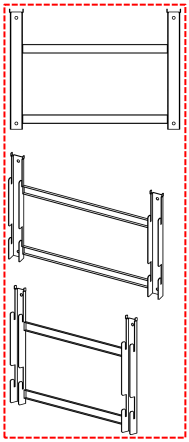


❺ (Optional) When more than 3 battery packs are connected, 2 columns need to be installed (a single fixed base can only withstand up to 3 battery packs), the two columns of battery packs are connected through the battery positive and negative power cables, and the RS485 communication cable, please refer to 6.2 Internal Wiring of the Energy Storage System.

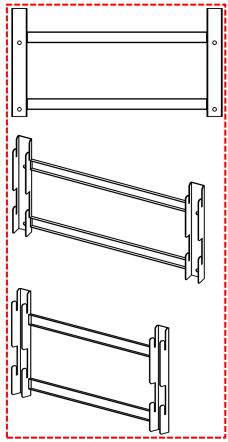


- Install by wall-mounted bracket (optional accessories)

❶ Prepare the battery mounting bracket and the inverter mounting bracket.

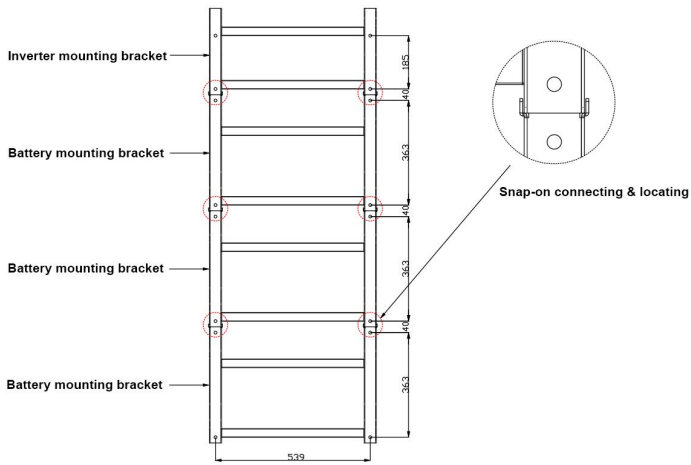


Battery mounting bracket (subject to actual battery pack quantity)

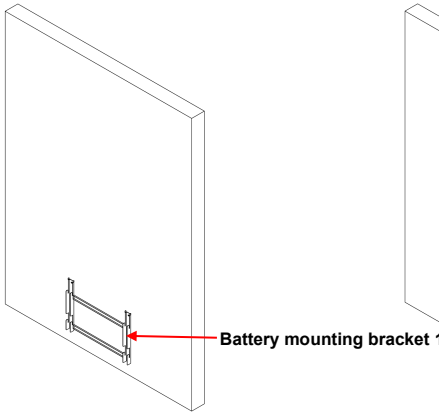


Inverter mounting bracket (1 set)

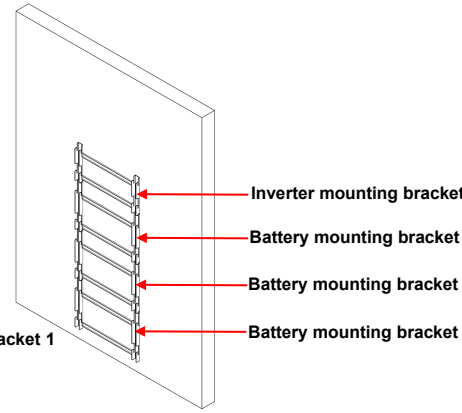
❷ Drill holes in the wall at suitable positions according to the mounting template below (the mounting template is illustrated below with the example of 3 battery packs + the inverter).



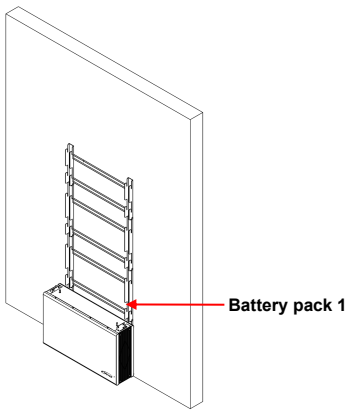
❸ Use 4PCS M8*50 expansion bolts to fix the battery mounting bracket to a wall that meets the installation requirements.



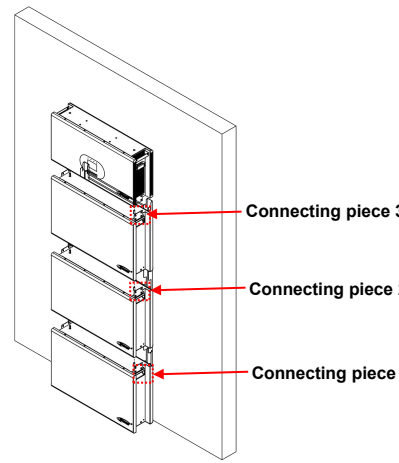
❹ Install the rest battery packs and the inverter in sequence on the wall.



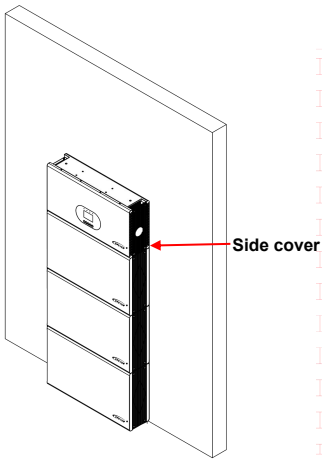
❺ Install the first battery pack on battery mounting bracket 1.



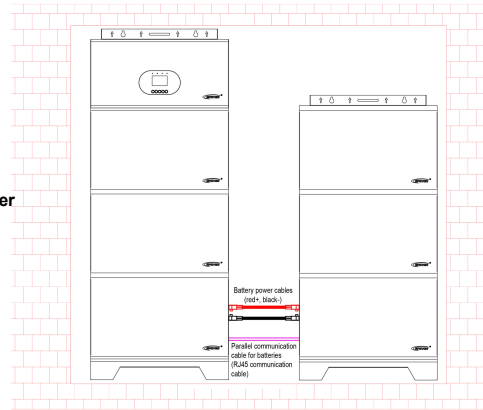
❻ Stack the rest battery packs and the inverter in sequence on the wall mounting bracket, tighten the connecting pieces on the side with screws.



❼ Install the side cover.



❽ (Optional) When more than 3 battery packs are connected, it is recommended to install them into 2 columns (to avoid high stacking, which is inconvenient for maintenance in the future), the two columns of battery packs are connected through the battery positive and negative power cables, and the RS485 communication cable, please refer to 6.2 Internal Wiring of the Energy Storage System.



4 Electrical Connection of the Energy Storage System

Attention

 **WARNING**	• Before electrical connection, ensure that the inverter power switch, PV input switch, battery circuit breaker and all the switches connected to the Energy Storage System are set to OFF or disconnected. Otherwise, the high voltage of the Energy Storage System may result in electric shocks. • When wiring, do not connect the circuit breaker and ensure the polarities of each component are connected correctly. • Check if the connections are tight after wiring. Loose connectors and corroded wires may generate great heat, melting the wire insulation, burning the surrounding materials and even causing a fire. Ensure the connectors are tightened and secure cables with cable ties to avoid loose connectors caused by cables shaking when moving the application. • Both Utility input and AC output are high voltage. Please do not touch the wiring connection. • When the fan is working, please do not touch it to avoid injury. • Only the lithium battery type that is compatible with this Energy Storage System can be charged. • After turning off the power switch, there is still high voltage inside the Energy Storage System, please do not open or touch the internal components, and wait for 10 minutes before related operations.
 **CAUTION**	• Equipment damage caused by incorrect wiring is not covered by the warranty. • Operations related to electrical connections must be performed by a professional electrical technician. • During electrical connection, the operator must wear personal protective equipment. • Although the DC input terminal has reverse polarity protection (only HP5542F-AH1050P20 converter has this function), which only takes effect when no PV or Utility is connected; please follow the operation strictly and do not operate it in error frequently.

4.1 Wire and circuit breaker size

The wiring and installation methods should comply with national and local electrical code regulations.

- **Recommended PV array wire and circuit breaker size**

Since the PV array output current varies according to the PV module's type, connection method and sunlight angle, the minimum PV wire size can be calculated by the PV array Isc (short circuit current). Please refer to the Isc value in the PV module's specifications. When the PV modules are connected in series, the total Isc is equal to any PV module's Isc. When the PV modules are connected in parallel, the total Isc is equal to the sum of all the PV modules' Isc. The PV array's Isc must not exceed the PV maximum input current. For maximum PV input current and maximum PV wire size, please refer to the table below:

When two PV arrays are connected separately, the wire and circuit breaker size of each PV array are as follows:

Model	Recommended PV array wire size	Recommended circuit breaker size
HP5542F-AH1050P20 HP5542F-AH1050P20E	6mm^2/10AWG	2P—25A

When two PV arrays are connected in parallel, the wire and circuit breaker size are as follows:

Model	Recommended PV array wire size	Recommended circuit breaker size
HP5542F-AH1050P20 HP5542F-AH1050P20E	10mm^2/7AWG	2P—50A

CAUTION	When the PV modules are connected in series, the total voltage must not exceed the maximum PV open circuit voltage 500V (at the lowest environment temperature) or 440V (at 25℃).

- **Recommended Utility wire size**

Model	Recommended Utility wire size	Recommended circuit breaker size
HP5542F-AH1050P20 HP5542F-AH1050P20E	6mm^2/10AWG	2P—40A

- **Recommended lithium battery wire and circuit breaker size**

Model	Lithium battery wire size	Recommended circuit breaker size
HP5542F-AH1050P20 HP5542F-AH1050P20E	27mm^2/3AWG	2P—200A

CAUTION	For the battery, the recommended wire size is selected according to the conditions that its terminals are not connected to any additional Energy Storage System.

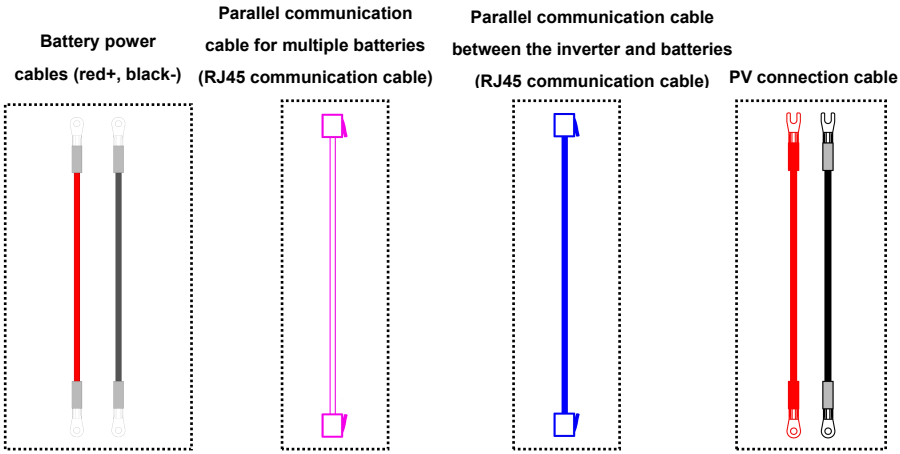
➢ **Recommended AC output wire size**

Model	Recommended load wire size	Recommended circuit breaker size
HP5542F-AH1050P20 HP5542F-AH1050P20E	6mm²/10AWG	2P—40A

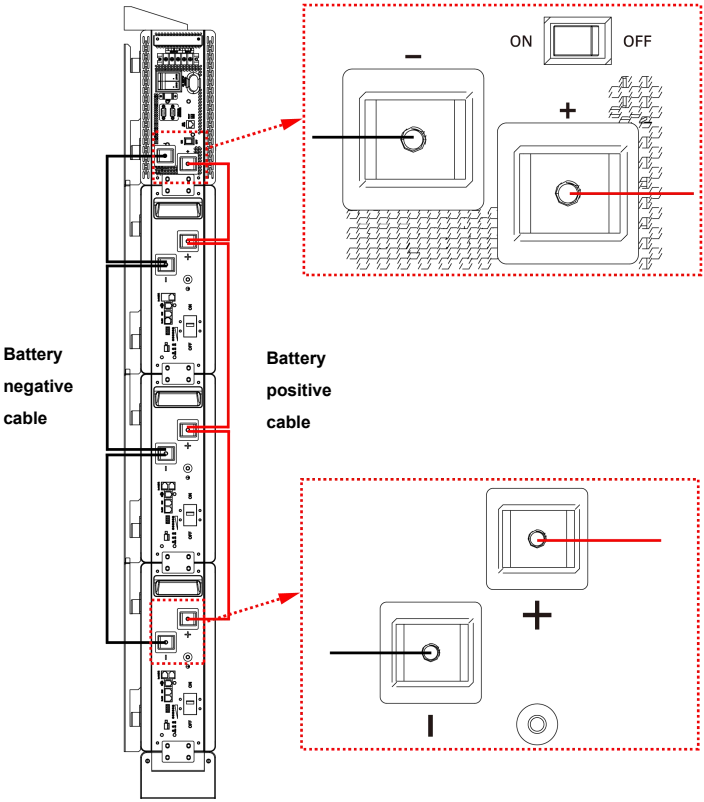
CAUTION	• If there is a long distance between the PV array and the Energy Storage System, larger wires shall be used to reduce the voltage drop and improve the system performance. • The above sizes for wire and circuit breaker are for reference only, please choose a suitable wire and circuit breaker according to the actual situation.

4.2 Internal wiring of the Energy Storage System

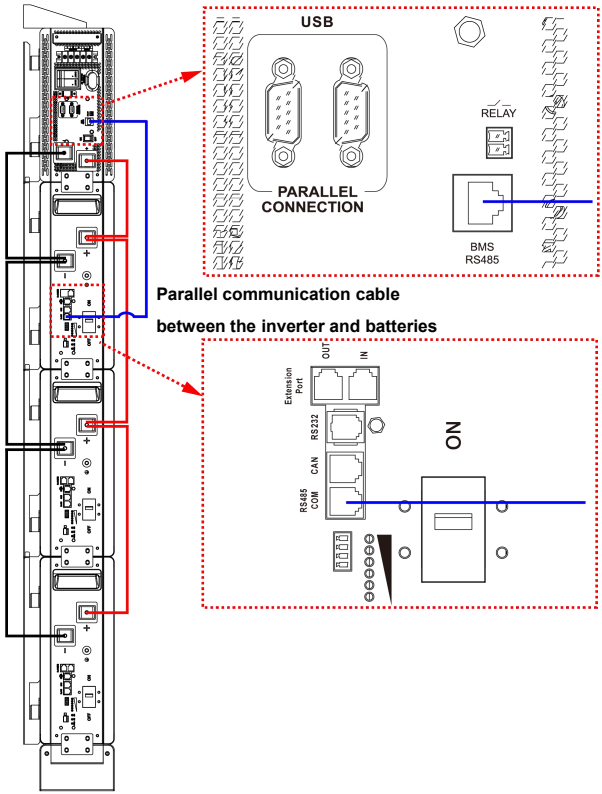
❶ Prepare the cables for wiring the Energy Storage System.



❷ Connect the battery power cables (red+, black-).

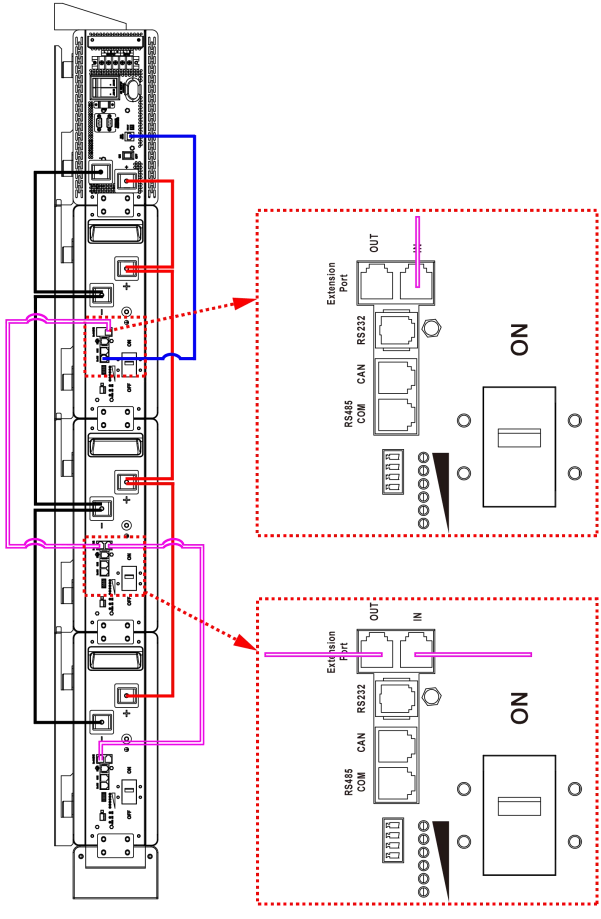


❸ Connect the parallel communication cable between the inverter and batteries (RJ45 communication cable).

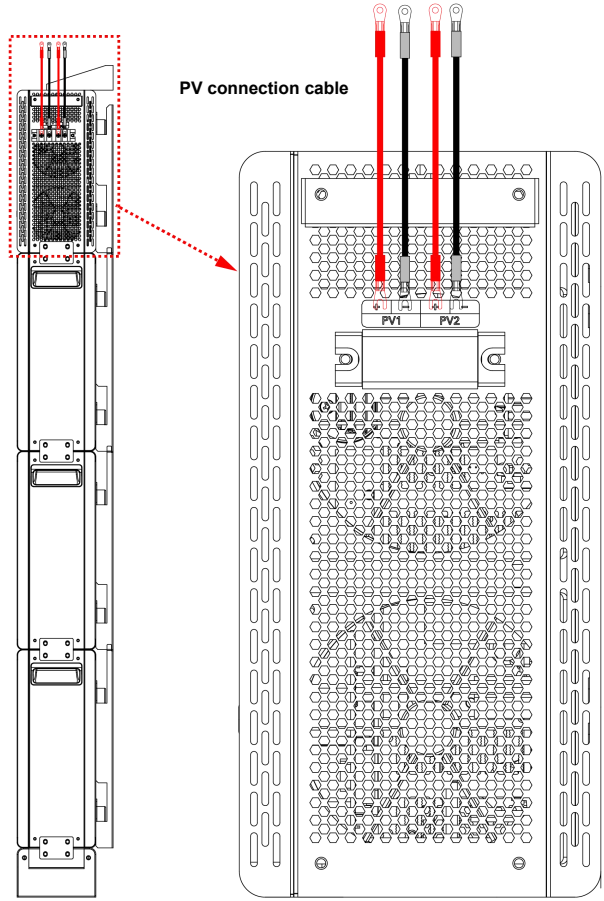


❹ Connect parallel communication cable for multiple batteries (RJ45 communication cable).

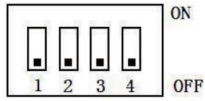
Parallel communication cable for multiple batteries



❺ Connect the PV connection cable to the designated position of the Energy Storage System.



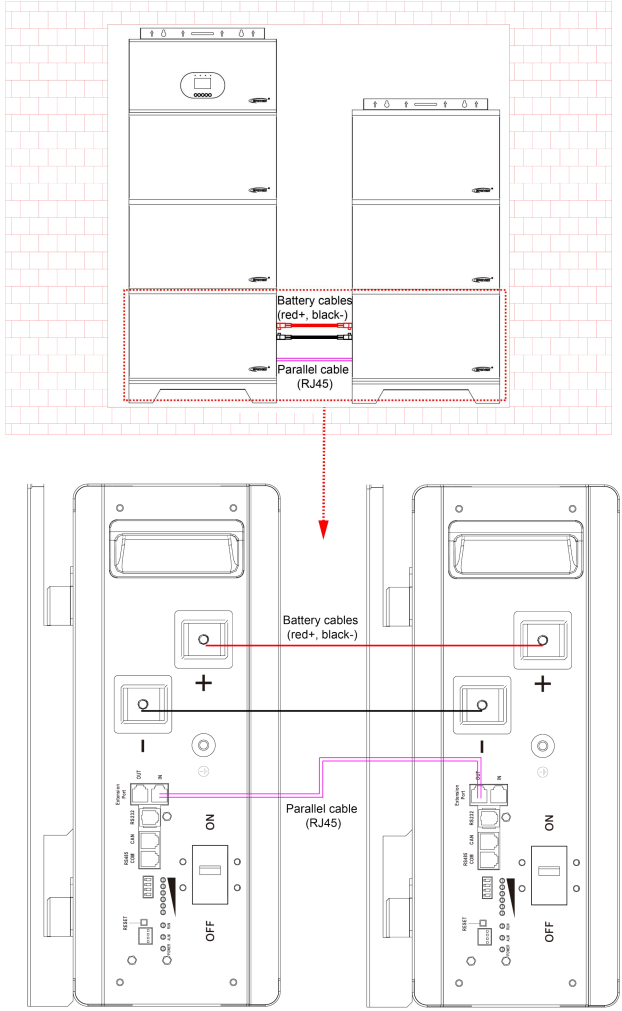
❻ (Optional) When multiple battery packs are used in parallel, you need to set the communication address of battery pack through the DIP switch of the BMS. The communication address can be set to any number within 1–15 and cannot be repeated. However, there must be a battery pack set to 1 (i.e. the main battery pack) to communicate with the inverter.



Note: It is recommended to set the lithium battery pack closest to the inverter as 1 for easy wiring.

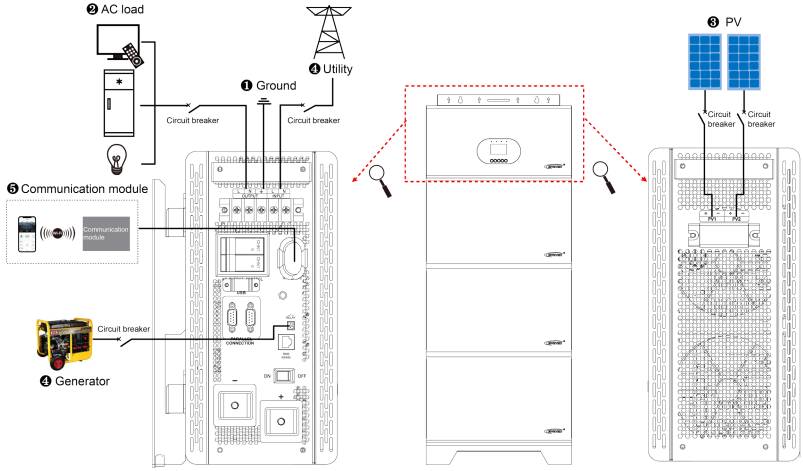
DIP Switch / Communication ID	#1	#2	#3	#4
0	OFF	OFF	OFF	OFF
1	**ON**	OFF	OFF	OFF
2	OFF	**ON**	OFF	OFF
3	**ON**	**ON**	OFF	OFF
4	OFF	OFF	**ON**	OFF
5	**ON**	OFF	**ON**	OFF
6	OFF	**ON**	**ON**	OFF
7	**ON**	**ON**	**ON**	OFF
8	OFF	OFF	OFF	**ON**
9	**ON**	OFF	OFF	**ON**
10	OFF	**ON**	OFF	**ON**
11	**ON**	**ON**	OFF	**ON**
12	OFF	OFF	**ON**	**ON**
13	**ON**	OFF	**ON**	**ON**
14	OFF	**ON**	**ON**	**ON**
15	**ON**	**ON**	**ON**	**ON**

❼ (Optional) When more than 3 battery packs are connected, it is recommended to install them into 2 columns, the two columns of battery packs are connected through the battery positive and negative power cables, and the RS485 communication cable.



4.3 External wiring of the Energy Storage System

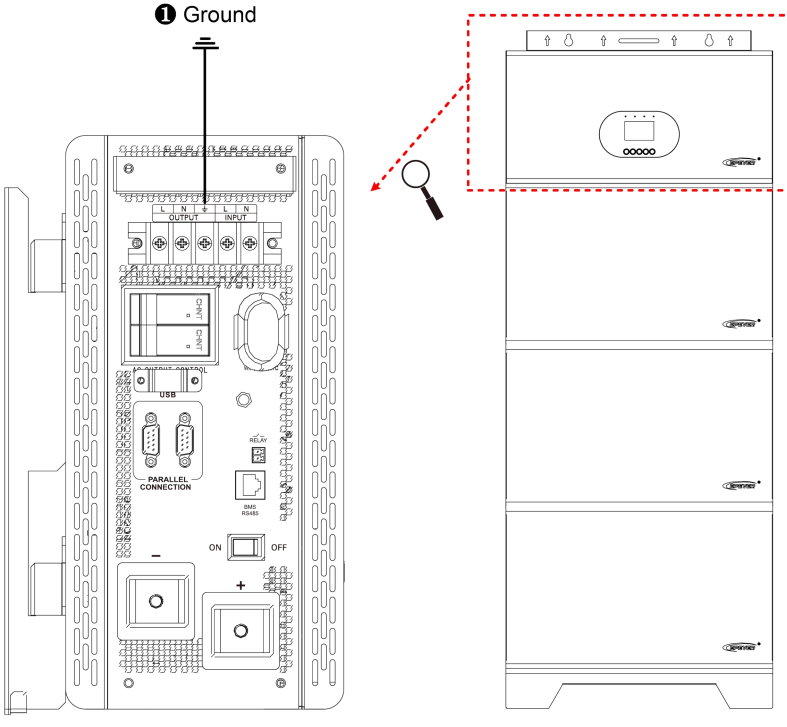
Connect the Energy Storage System in the order of "❶Ground > ❷Load > ❸PV > ❹ Utility or Generator > ❺Optional accessories (communication modules)," and disconnect the Energy Storage System in the reverse order.



1. Grounding

The grounding terminal of the Energy Storage System must be grounded correctly and reliably, and the cross-sectional area of the grounding wire is required to be consistent with the recommended load wire size, and the grounding connection point shall be as close as possible to the Energy Storage System, and the shorter the grounding wire, the better.

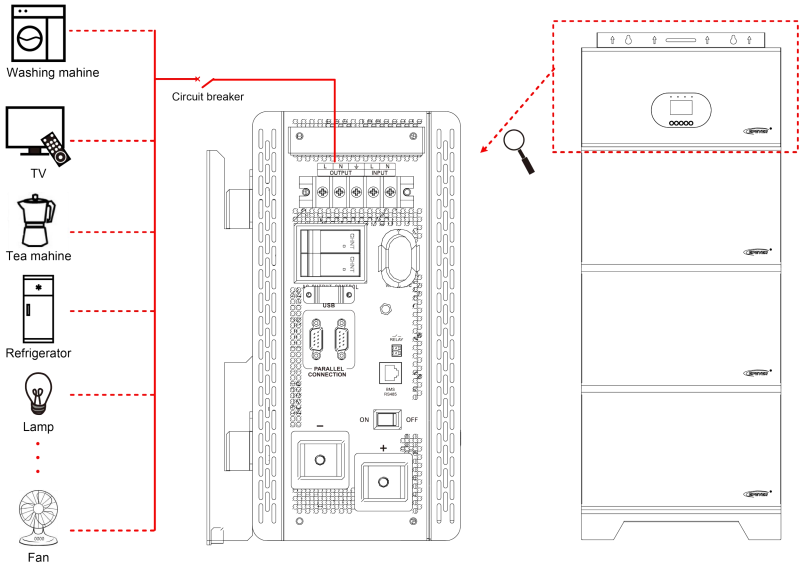
☒ No grounding	☒ Do not ground the battery terminals.
	☒ Do not ground the PV terminals.
	☒ Do not ground the AC input L or N terminals between the Energy Storage System and the household power distribution cabinet.
	☒ Do not ground the AC output L or N terminals.
☑ Grounding	☑ The cabinet is connected to earth through the earth rail, along with the AC input and output's PE (Protective Earth) terminal.


❶ Ground
L N ⏚ L N
OUTPUT
INPUT
USB
PARALLEL
CONNECTION
RELAY
BMS
RS485
ON
OFF
–
+

2. Connect the AC loads

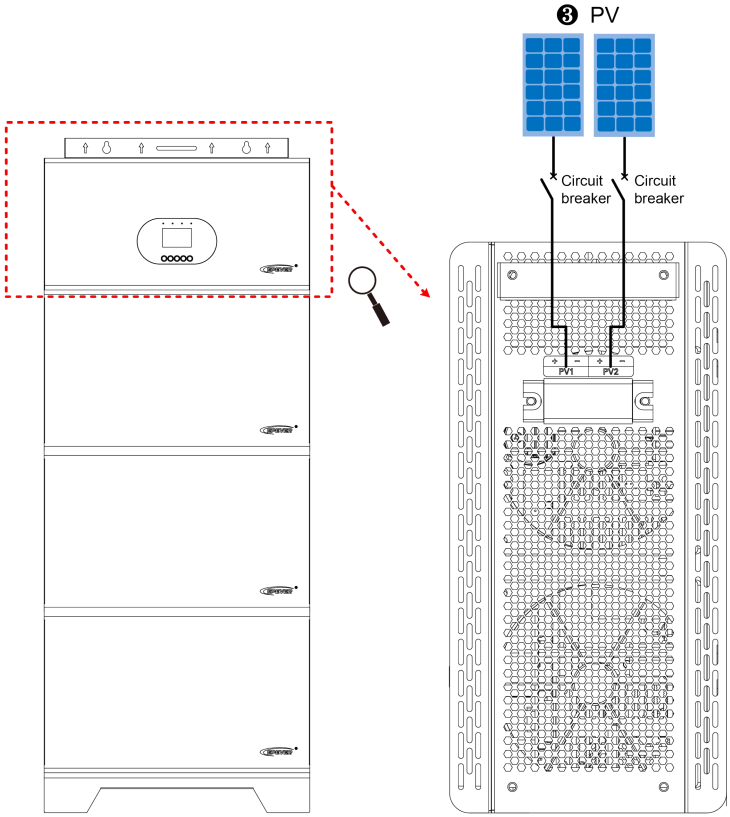
WARNING	• Risk of high voltage! The AC output can generate very high voltage, disconnect the circuit breaker before wiring and ensure that the poles' leads are connected correctly. • The AC loads shall be determined by the continuous output power of the Energy Storage System. The AC load's surge power must be lower than the instantaneous surge power of the Energy Storage System, otherwise the Energy Storage System will be damaged. • If inductive loads such as motors, or a bidirectional transfer switch is connected to the AC output terminal, a separate overvoltage and overcurrent protector (VA-Protector) needs to be installed at the AC output terminal.

❷ AC load



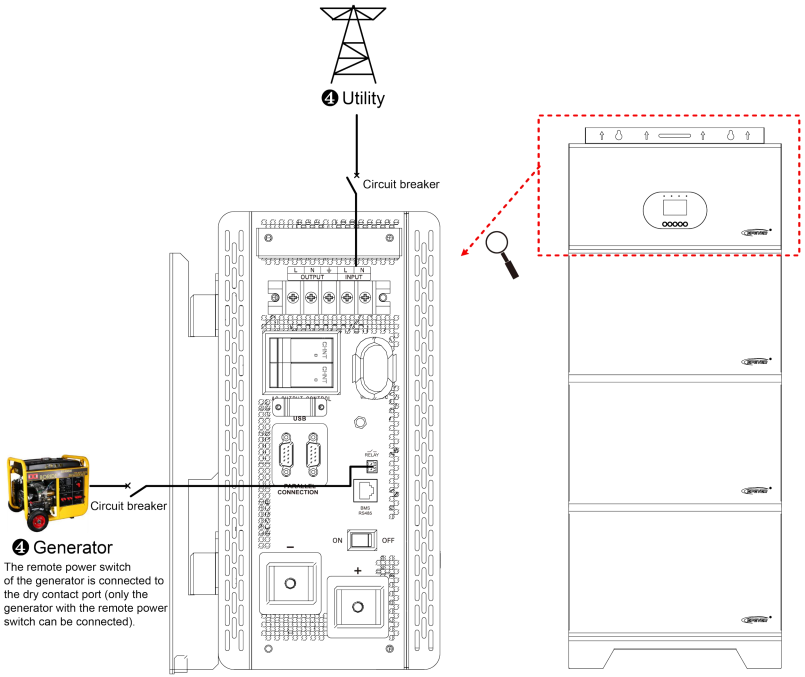
3. Connect the PV modules

WARNING	• Risk of high voltage! The PV array can generate very high voltage, disconnect the circuit breaker before wiring, and ensure that the leads of "+" and "-" poles are connected correctly. • Do not ground the PV positive or negative poles; otherwise, the Energy Storage System will be damaged.
CAUTION	If the Energy Storage System is used in an area with frequent lightning strikes, then an external surge arrester must be installed at the PV input and Utility input terminals.



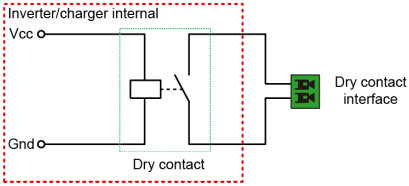
4. Connect the Utility or generator

WARNING	• Risk of high voltage! The Utility input can generate very high voltage, disconnect the circuit breaker or fast-acting fuse before wiring and ensure that the poles' leads are connected correctly. • If the Utility is connected, the PV and battery cannot be grounded. In contrast, the Energy Storage System cabinet must be grounded reliably to shield the outside electromagnetic interference effectively and prevent the cabinet from causing electric shock to the human body.
CAUTION	There are various types of oil generators with complex output situations. It is recommended to use the variable frequency oil generator. If a non-variable frequency oil generator is used, actual testing is required before use..



Dry contact interface:

✧ The dry contact interface can turn on/off the oil generator and is connected parallel with the oil generator's switch.

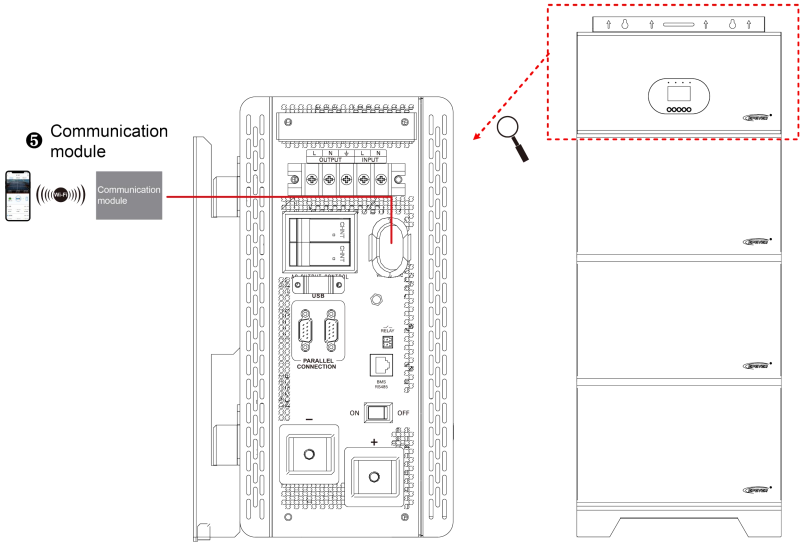


✧ Working principle:

When the battery voltage reaches the Dry Contact ON Voltage, the dry contact is connected. Its coil is energized. The dry contact can drive loads of no more than 125VAC/1A, 30VDC/1A. The default values of the Dry Contact ON Voltage and the Dry Contact OFF Voltage of the Energy Storage System are different, subject to battery types. Please refer to the chapter 4.5.1 Parameters list > Basic Param Setup" for the details of Dry Contact ON Voltage and the Dry Contact OFF Voltage.

5. Connect optional accessories (communication modules)

Connect the WIFI module, or TCP module to the RS485 com. port. End-users can remotely monitor the Energy Storage System or modify its related parameters on the APP by phone. For detailed setting methods, please refer to the instructions on cloud APP, WIFI or TCP modules in user manual.



Note: For specific communication module models supported by this system, please refer to the attached accessory list.

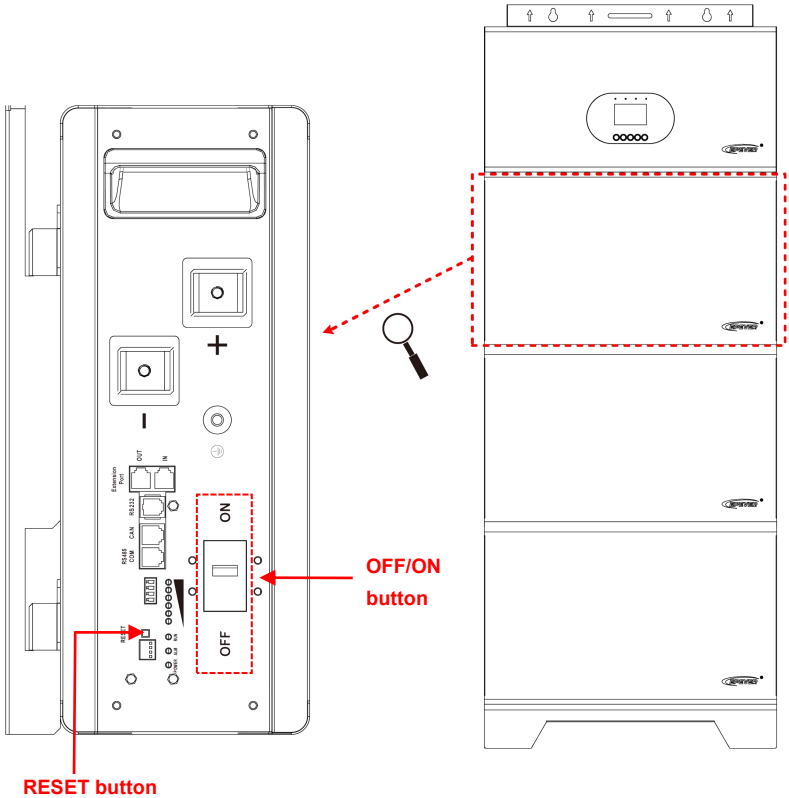
4.4 Operate the Energy Storage System

Step 1: Check the wiring. Ensure that the positive and negative wiring of the lithium battery and PV module are connected correctly, that the Utility wiring is connected correctly, that the parallel communication cables for the lithium batteries are connected correctly, and that the communication cables between the lithium batteries and the inverter are connected correctly.

Step 2: Check the communication ID of each battery pack, ensure there is no repeated communication ID and the communication ID of the lithium battery pack connected to the inverter is set as 1.

Step 3: Switch the OFF/ON button of each lithium battery pack to ON. Ensure that all lithium battery packs are in the inactive state (i.e. the lithium battery indicators are all off).

Step 4 (Optional): Press the “RESET” button on the battery pack 1 (i.e. the battery pack with communication ID “1”) as illustrated below. And other battery packs will self-activate.

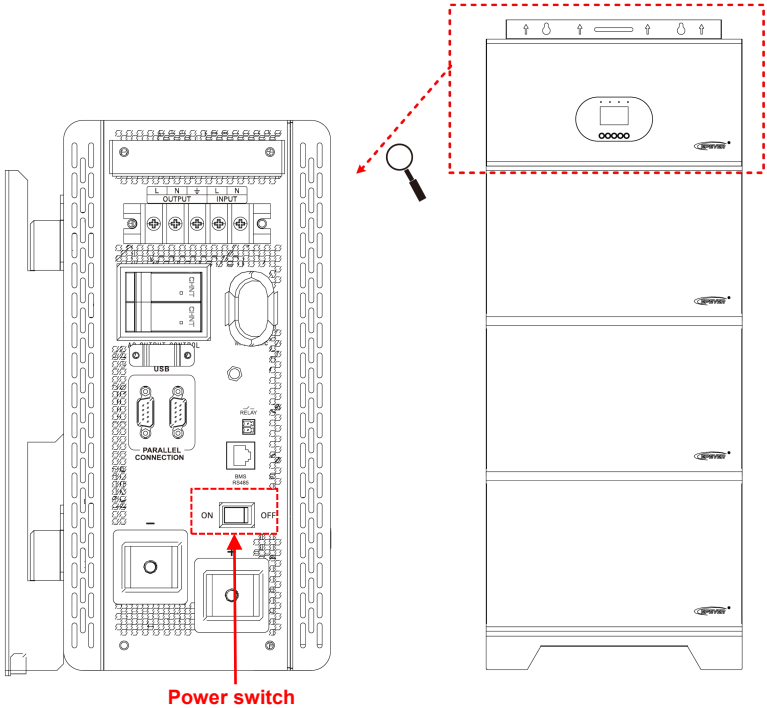


CAUTION	1. Activation of lithium battery packs takes more than 40 seconds, please wait for the activation to complete before proceeding to the next step. 2. When multiple lithium battery packs are used in parallel, the communication ID of each lithium battery pack cannot be repeated, and the communication ID of the lithium battery pack connected to the inverter must be set to 1, otherwise the communication will fail.

IMPORTANT: Based on the lithium battery pack with the lowest voltage, the lithium battery pack with a voltage difference of less than 1.5V will be automatically integrated into the system, and the lithium battery pack with a voltage difference of more than 1.5V cannot be incorporated into the system. If the voltage difference is more than 1.5V, the battery pack needs to be charged, and when the voltage

difference is less than 0.5V, the battery pack will be automatically integrated into the system.

Step 5: Turn on the power switch of the Energy Storage System, the LCD will be lit, indicating the normal system running (the whole system can also be activated by Step 5 when skipping Step 4).



Step 6: Set parameters by the buttons.

CAUTION	For detailed parameters setting, please refer to chapter 4.5 Parameters setting. Please consult relevant technical personnel if you have any question before setting.

Step 7: Use the Energy Storage System.

Connect the load circuit breaker, the PV array circuit breaker and the Utility circuit breaker in sequence. After the AC output is normal, turn on the AC loads one by one. Do not turn on all the loads simultaneously to avoid protection action due to a large transient impulse from the current. The Energy Storage System will perform normal work according to the set working mode. The system running status can be viewed on the LCD screen, see chapter 4.4. Interface for more details.

⚠ **CAUTION**	• When supplying power for different AC loads, it is recommended to turn on the load with larger impulse current first. After the load output is stable, turn on the load with smaller impulse current later. • If the Energy Storage System cannot work properly or the LCD/indicator shows an abnormality, please refer to chapter 9 Troubleshooting or contact our after-sales personnel.

4.5 Lithium battery sleep and wake up

4.5.1 Lithium battery sleep

When any of the following conditions is met, it will enter low power mode (sleep mode):

Note: Before entering sleep mode, it is required to meet the conditions of no external communication, no charger and no current.

1) Individual or total overdischarge protection has not been removed within 30 seconds.

2) Press the “RESET” button twice, for the 1st time, there is no time limit; for the 2nd time, press the button for 3–6 seconds and then release (Note: under parallel operation, it is required to press the “RESET” button of “battery pack 1” twice).

3) The standby time exceeds the set time (24H).

4.5.2 Lithium battery wake up

When the system is in low power mode and any of the following conditions is met, the system will exit low power mode and enter normal operation mode:

1) When it is connected to charger and the charger output voltage is greater than 48V.

2) Press the “RESET” button on “Battery pack 1” and then release.

3) RS485 communication is activated (it is activated after the communication between the lithium battery packs and the inverter is normal).

5 Working Modes

5.1 Abbreviation

Abbreviation	Instruction
P_{PV}	PV power
P_{LOAD}	Load power
V_{BAT}	Battery voltage
LVD	Low Voltage Disconnect Voltage
LVR	Low Voltage Reconnect Voltage
LED	Low Energy Disconnect SOC
LER	Low Energy Disconnect Recover SOC
AOF	Auxiliary module OFF voltage (i.e.Utility charging OFF voltage)
AON	Auxiliary module ON voltage (i.e. Utility charging ON voltage)
UCF	Utility Charging OFF SOC
UCO	Utility Charging ON SOC
MCC	Battery Max. Charging Current
SOC	The battery charging state, which indicates the ratio of the current storage capacity dividing the maximum storage capacity. This value is automatically read from the BMS and displayed on the "BAT DATA" interface.
PV>BP>BT	Discharging Mode: PV > Bypass > Battery
PV>BT>BP	Discharging Mode: PV > Battery > Bypass
BP>PV>BT	Discharging Mode: Bypass > PV > Battery

5.2 Battery mode

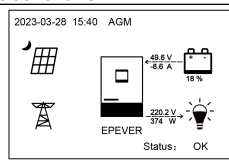
5.2.1 Scenario A: Both PV and Utility are not available.

(A)

PV ☒

Utility ☒

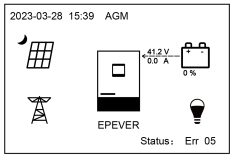
Regardless of the charging mode and discharging mode, the working mode is as follows.



$V_{BAT} \geq LVR$ / $SOC \geq LER$ ⇵ $V_{BAT} \leq LVD$ / $SOC \leq LED$

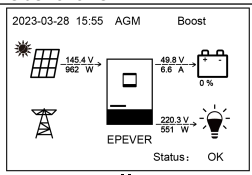
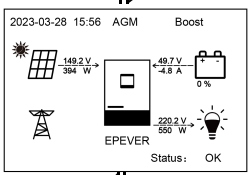
❶ When any of the following conditions is met, the battery supplies the load.

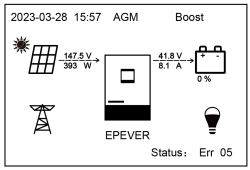
- The battery voltage is greater than or equal to the **LVR** value.
- The battery SOC is greater than or equal to the **LER** value.

		❷ When any of the following conditions is met, the battery stops supplying the load. • The battery voltage is lower than or equal to the **LVD** value. • The battery SOC is lower than or equal to the **LED** value.

CAUTION	• Set the "ChargeControlMode" as "VOLT," the working mode is determined by the battery voltage value. • Set the “ChargeControlMode” as “SOC,” the working mode is determined by the battery SOC. Before setting the “ChargeControlMode” as “SOC,” set the "ChargeControlMode" as "VOLT” first, the SOC control mode will be more accurate after a full charge-discharge cycle. • For the setting of the "ChargeControlMode," please refer to Chapter 4.5.1 Parameters list.

5.2.2 Scenario B: PV is available, but the Utility is not available.

	Regardless of the charging mode and discharging mode, the working mode is as follows.
(B) **PV** ☑ **Utility** ☒	 $P_{PV} > P_{LOAD}$  $P_{PV} \le P_{LOAD}$  $V_{BAT} \ge$ LVR / SOC ≥ LER  $V_{BAT} \le$ LVD / SOC ≤ LED	❶ When the PV power is greater than the load power, PV charges the battery and supplies extra power to the load. ❷ When the PV power is lower than or equal to the load power, the PV will not charge the battery, the battery will cut in to supply power to the load together with the PV.



❸ When any of the following conditions is met, the PV and the battery stop supplying power to the load, PV charges the battery only.

- The battery voltage is lower than or equal to the **LVD** value.
- The battery SOC is lower than or equal to the **LED** value.

Note: When the battery voltage is greater than or equal to the LVR value, or the battery SOC is greater than or equal to the LER value, the system returns to working mode ❷.

5.2.3 Scenario C: Both PV and Utility are available.

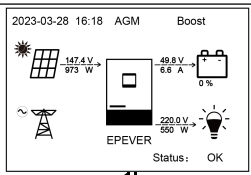
(C-1)

PV ☑

Utility ☑

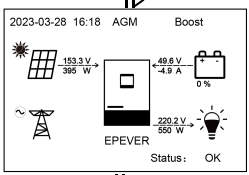
Charging Mode: "Solar"

Discharging Mode: "PV>BP>BT" or "PV>BT>BP"



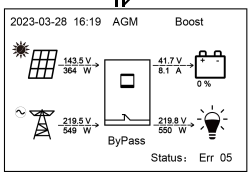
❶ When the PV power is greater than load power, the PV charges the battery and supplies extra power to the load.

$P_{PV} > P_{LOAD}$ / $P_{PV} \le P_{LOAD}$



❷ When the PV power is lower than or equal to the load power, the PV will not charge the battery, the battery will cut in to supply power to the load together with the PV.

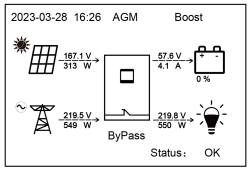
$V_{BAT} \ge LVR$ / $SOC \ge LER$; $V_{BAT} \le LVD$ / $SOC \le LED$

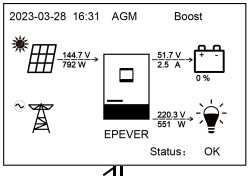
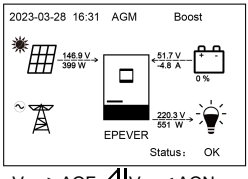
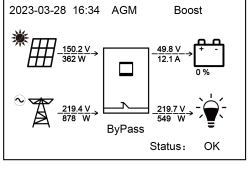


❸ When any of the following conditions is met, the Utility supplies power to the load and the PV charges the battery.

- The battery voltage is lower than or equal to the **LVD** value.
- The battery SOC is lower than or equal to the **LED** value.

Note: When the battery voltage is greater than or equal to the LVR value, or the battery SOC is greater than or equal to the LER value, the system returns to working mode ❷.

	Charging Mode: “Solar”	Discharging Mode: “BP>PV>BT”
(C-2) **PV** ☑ **Utility** ☑		The Utility supplies power to the load, and the PV charges the battery.

	Charging Mode: “Solar prior”	Discharging Mode: “PV>BP>BT” or “PV>BT>BP”
(C-3) **PV** ☑ **Utility** ☑	 $P_{PV} > P_{LOAD}$ ⇅ $P_{PV} \le P_{LOAD}$  $V_{BAT} \ge AOF$ / $SOC \ge UCF$ ⇅ $V_{BAT} \le AON$ / $SOC \le UCO$ 	❶ When the PV power is greater than the load power, the PV charges the battery and supplies extra power to the load. ❷ When the PV power is lower than or equal to the load power, the PV will not charge the battery, the battery will cut in to supply power to the load together with the PV. ❸ When any of the following conditions is met, the Utility supplies power to the load and charges the battery together with the PV. • The battery voltage is lower than or equal to the **AON** value. • The battery SOC is lower than or equal to the **UCO** value.

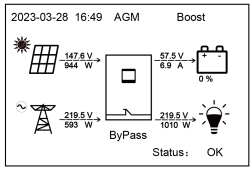
Note: When the battery voltage is greater than or equal to the AOF value, or the battery SOC is greater than or equals to the UCF value, the system returns to working mode ❷.

(C-4)

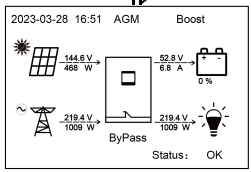
PV ☑

Utility ☑

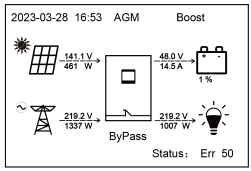
Charging Mode: "Solar prior"



P_{PV} > MCC*V ‖ P_{PV} ≤ MCC*V



V_{BAT} ≥ AOF / SOC ≥ UCF ‖ V_{BAT} ≤ AON / SOC ≤ UCO



Discharging Mode: "BP>PV>BT"

❶ When the PV power is greater than the (**MCC***V_{BAT}), the Utility and PV supply power to the load, and the PV charges the battery at the same time.

❷ When the PV power is lower than or equal to the (**MCC***V_{BAT}), the Utility supplies power to the load and the PV charges the battery.

❸ When any of the following conditions is met, the Utility supplies power to the load and charges the battery together with the PV.

- The battery voltage is lower than or equal to the **AON** value.
- The battery SOC is lower than or equal to the **UCO** value.

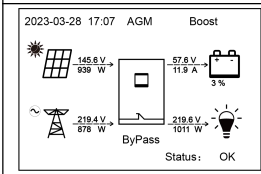
Note: When the battery voltage is greater than or equal to the AOF value, or the battery SOC is greater than or equals to the UCF value, the system returns to working mode ❷.

(C-5)

PV ☑

Utility ☑

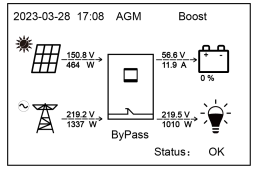
Charging Mode: "Utly & solr"

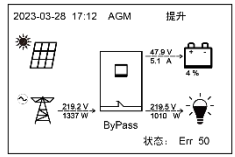


P_{PV} > MCC*V_{Bat} ‖ P_{PV} ≤ MCC*V_{Bat}

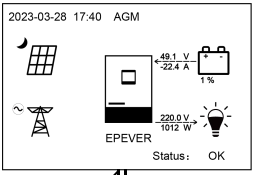
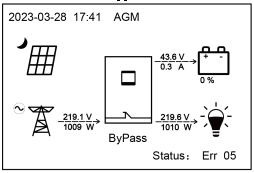
Discharging Mode: No impact under any mode.

❶ When the PV power is greater than the (**MCC***V_{BAT}), the Utility and PV supply power to the load, and the PV charges the battery simultaneously.

		❷ When the PV power is lower than or equal to the (**MCC***V_{BAT}), the Utility and PV charge the battery, and the Utility supplies power to the load.

(C-6) **PV** ☑ **Utility** ☑	**Charging Mode: "Utltyprior"**	**Discharging Mode: No impact under any mode.**
		The Utility supplies power to the load and charges the battery simultaneously.

5.2.4 Scenario D: The PV is not available, but the Utility is available.

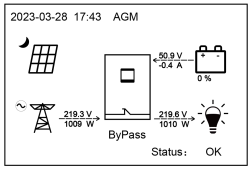
(D-1) **PV** ☒ **Utility** ☑	**Charging Mode: "Solar"**	**Discharging Mode: "PV>BT>BP"**
	 V_{BAT} ≥ LVR / SOC ≥ LER V_{BAT} ≤ LVD / SOC ≤ LED 	❶ When any of the following conditions is met, the battery supplies the load. • The battery voltage is greater than or equal to the **LVR** value. • The battery SOC is greater than or equal to the **LER** value. ❷ When any of the following conditions is met, the Utility supplies power to the load. • The battery voltage is lower than or equal to the **LVD** value. • The battery SOC is lower than or equal to the **LED** value.

(D-2)

PV ☒

Utility ☑

Charging Mode: "Solar"



Discharging Mode: "PV>BP>BT" or "BP>PV>BT"

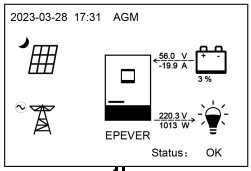
The Utility supplies power to the load.

(D-3)

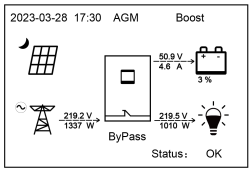
PV ☒

Utility ☑

Charging Mode: "Solar prior"



$V_{BAT} \geq AOF$ / $SOC \geq UCF$ ‖ $V_{BAT} \leq AON$ / $SOC \leq UCO$



Discharging Mode: "PV>BT>BP"

❶ When any of the following conditions is met, the battery supplies the load.

- The battery voltage is higher than or equal to the **AOF** value.
- The battery SOC is greater than or equal to the **UCF** value.

❷ When any of the following conditions is met,the Utility supplies power to the load and charges the battery simultaneously.

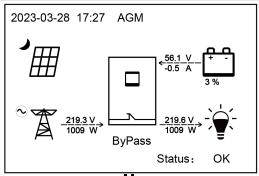
- The battery voltage is lower than or equal to the **AON** value.
- The battery SOC is lower than or equal to the **UCO** value.

(D-4)

PV ☒

Utility ☑

Charging Mode: "Solar prior"

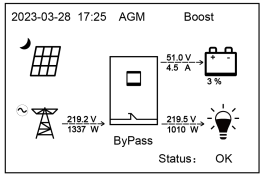


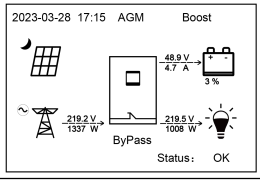
$V_{BAT} \geq AOF$ / $SOC \geq UCF$ ‖ $V_{BAT} \leq AON$ / $SOC \leq UCO$

Discharging Mode: "PV>BP>BT" or BP>PV>BT"

❶ When any of the following conditions is met, the Utility supplies power to the load.

- The battery voltage is higher than or equal to the **AOF** value.
- The battery SOC is greater than or equal to the **UCF** value.

		❷ When any of the following conditions is met, the Utility supplies power to the load and charges the battery simultaneously. • The battery voltage is lower than or equal to the **AON** value. • The battery SOC is lower than or equal to the **UCO** value.

	Charging Mode: "Utly & solr" or "Utltyprior"	**Discharging Mode: No impact under any mode**.
(D-5) **PV** ☒ **Utility** ☑		The Utility supplies power to the load and charges the battery simultaneously.

6 Protections

No.	Protections	Instruction
1	PV current/power limiting protection	● When the “PV Maximum Open-circuit Voltage” is less than 360V, the “PV Maximum Input Power” can exceed two times the rated input power. ● When the “PV Maximum Open-circuit Voltage” is greater than or equal to 360V, the “PV Maximum Input Power” cannot exceed the rated input power value.
2	PV short circuit protection	When the PV is not charging and a short circuit occurs, the Energy Storage System will not be damaged.
3	Utility input over voltage protection	When the Utility voltage exceeds the set value of “Utility over voltage disconnect voltage”, the Utility will stop charging and supplying the load.
4	Utility input under voltage protection	When the Utility voltage is lower than the set value of “Utility low voltage disconnect voltage”, the Utility will stop charging and supplying the load.
5	Battery reverse polarity protection (only the HP5542F-AH1050P20 converter has this function)	When the battery polarity is reversed, the Energy Storage System will not be damaged and will resume to normal operation after correcting the wire error. ⚠ **CAUTION: The Energy Storage System will be damaged when the PV/Utility is connected correctly and the battery polarity is reversed.**
6	Battery over voltage protection	When the battery voltage exceeds the “Over Voltage Disconnect Voltage,” the PV/Utility will stop charging the battery to protect the battery from overcharging.
7	Battery over discharge protection	When the battery voltage is lower than the “Low Voltage Disconnect Voltage,” the battery will stop discharging to protect the battery from overdischarging.

<table>
<tr><th>No.</th><th>Protections</th><th colspan="3">Instruction</th></tr>
<tr><td>8</td><td>Load output short circuit protection</td><td colspan="3">The load output is turned off immediately when a short circuit occurs. And then, the output is recovered automatically after a delay time of 5s, 10s, and 15s separately (if the recovery is less than 3 times within 5 minutes, it will be recounted). The Energy Storage System stops working after the 4th protection and can resume working after resetting or restarting. Clear the short circuit fault in time because it may damage the Energy Storage System permanently if it is not cleared for a long time.
Note: Resetting--See chapter 4.4.3Administrator interface to enter the “5. Basic Param Setup” interface, and then click the UP/DOWN button to locate the "FR (fault reset)" menu. Click the ENTER button to exit the current fault state and resume normal operation.</td></tr>
<tr><td>9</td><td>Device overheating protection</td><td colspan="3">When the internal temperature overheats, the Energy Storage System will stop charging/discharging.
The Energy Storage System will resume charging/discharging when the internal temperature is normal and the protection time lasts for more than 20 minutes.</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">HP5542F-AH1050P20
HP5542F-AH1050P20E
Inverter overload protecction
(no Utility)</td><td>5,665W≤P<6,600W</td><td>6,600W≤P<7,700W</td><td>P≥7,700W</td></tr>
<tr><td>Protect after 30 seconds</td><td>Protect after 10 seconds</td><td>Protect immediately</td></tr>
<tr><td colspan="3">Note: The output is recovered automatically after a delay time of 5s, 10s, and 15s separately. The Energy Storage System stops working after the 4th protection and can resume working after resetting or restarting.</td></tr>
<tr><td rowspan="3">11</td><td rowspan="3">HP5542F-AH1050P20
HP5542F-AH1050P20E
Utility bypass overload protection
(No battery mode)</td><td>6,050W≤P<6,985W</td><td>6,985W≤P<8,085W</td><td>P≥8,085W</td></tr>
<tr><td>Protect after 30 seconds</td><td>Protect after 10 seconds</td><td>Protect immediately</td></tr>
<tr><td colspan="3">Note: The output is recovered automatically after a delay time of 5s, 10s, and 15s separately. The Energy Storage System stops working after the 4th protection and can resume working after resetting or restarting.</td></tr>
</table>

No.	Protections	Instruction	No.	Protections
12	HP5542F-AH1050P20 HP5542F-AH1050P20E Utility bypass overload protection (Battery mode)	8,550W≤P<9,485W	9,485W≤P<10,585W	P≥10,585W
		Protect after 30 seconds	Protect after 10 seconds	Protect immediately
		Note: The output is recovered automatically after a delay time of 5s, 10s, and 15s separately. The Energy Storage System stops working after the 4th protection and can resume working after resetting or restarting.		

7 Troubleshooting

CAUTION	After the Energy Storage System is powered on, the meter displays the boot interface all the time (unable to enter the home interface) and the red "RUN" indicator flashes. It means the communication with the Energy Storage System is abnormal. When the above fault occurs, check whether the communication cable is disconnected. If not, don't hesitate to contact our after-sales engineer.

7.1 Battery faults

No.	Fault/Status	Error code①	Indicator	Buzzer	Solution
1	BAT OVP (Battery over voltage protection)	Err4	--	--	Disconnect the Utility and PV connection, and check whether the battery voltage is too high. Verify if the actual battery voltage matches the rated battery voltage; or check if the set value of "over voltage disconnect voltage" is inconsistent with the battery specifications. After the battery voltage drops below the set value of "over voltage reconnect voltage", the alarm will automatically be cleared.
2	BAT UVP (Battery under voltage protection)	Err5			Disconnect the loads connection, and check whether the battery voltage is too low. After the battery is charged and its voltage is restored to above the "low voltage reconnect voltage", it will return to normal, or use other methods to charge the battery.
3	BAT OTP (Battery over temperature protection)	Err11			Ensure the battery is installed in a cool and well-ventilated place, check that the battery actual charging and discharging current does not exceed the set values of "Battery Max. charging current " and "Battery limit discharging current." It resumes normal work when the battery cools down to below the "Battery over temperature protect recover."

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
4	BAT OCP (Battery over current protection)	Err37	--	--	Check if the battery actual charging/discharging current exceeds the set values of "Battery Max. charging current " and "Battery limit discharging current."
5	BAT DROP (Battery dropout)	Err39			Check whether the battery connection is normal, and whether the BMS protection occurs.
6	BAT UNDERVOLT WARN (Battery under voltage warning)	Err50			Check if the battery voltage is lower than the “under voltage warning voltage.”
7	BAT FTA (Battery fail to activate)	Err56			Check if the battery connection is normal and the BMS communication of the lithium battery is normal.

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

7.2 PV faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	PV1 OTP (PV1 over temperature protection)	Err13	PV indicator green on	--	Ensure the Energy Storage System is installed in a cool and well-ventilated place.
2	PV2 OTP (PV2 over temperature protection)	Err14			

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
3	PV1 OVP (PV1 over voltage protection)	Err15	PV indicator red on	Intermittent beeps	Check if the PV open-circuit voltage is too high (greater than 500V). The alarm is cleared when the PV open-circuit voltage is below 490V.
4	PV1 OCP (PV1 over current protection)	Err17	PV indicator green on	--	Turn off the Energy Storage System first, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
5	PV2 OVP (PV2 over voltage protection)	Err18	PV indicator red on	Intermittent beeps	Check if the PV open-circuit voltage is too high (greater than 500V). The alarm is cleared when the PV open-circuit voltage is below 490V.
6	PV2 OCP (PV2 over current protection)	Err20	PV indicator green on	--	Turn off the Energy Storage System first, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
7	PV HARD FAULT (PV hardware fault)	Err30			
8	PV1TS NC (PV1 temperature sensor no connection)	Err43			
9	PV2TS NC (PV2 temperature sensor no connection)	Err44			

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
10	PV1 PCTO (PV1 pre-charge timeout)	Err52	PV indicator green on	--	Turn off the Energy Storage System first, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
11	PV2 PCTO (PV2 pre-charge timeout)	Err53			

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will go off when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not go off.

7.3 Inverter faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	INV OCP (Inverter over current protection)	Err2	LOAD indicator red ON	Intermittent beeps	Check if the load actual power exceeds the rated power (i.e. the Energy Storage System's continuous output power), disconnect the load completely and turn off the Energy Storage System, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
2	INV OVP (Inverter over voltage protection)	Err7	LOAD indicator red ON	Intermittent beeps	Disconnect the load completely and turn off the Energy Storage System, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
3	INV OTP (Inverter over temperature protection)	Err10	--	--	Ensure the Energy Storage System is installed in a cool and well-ventilated place.
4	HARD INV OVP (Inverter hardware over voltage protection)	Err22	--	--	Disconnect the load completely and turn off the Energy Storage System, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
5	HARD INV OCP (Inverter hardware over current protection)	Err23			
6	INV VOLT OFFSET ERR (Inverter voltage offset error)	Err32			
7	INV CURR OFFSET ERR (Inverter current offset error)	Err35			
8	ITS NC (Internal temperature sensor no connection)	Err45	LOAD indicator green ON	--	Turn off the Energy Storage System, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
9	INV UVP (Inverter under voltage protection)	Err49	LOAD indicator red ON	Intermittent beeps	Check if the load actual power exceeds the rated power (i.e. the Energy Storage System's continuous output power), disconnect the load completely and turn off the Energy Storage System, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will go off when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not go off.

7.4 Utility faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	AC OVP (AC over voltage protection)	Err8	GRID indicator red on	Intermittent beeps	Check if the Utility voltage is normal (i.e. within the "Utility work voltage range"), disconnect the AC input completely and turn off the Energy Storage System. wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
2	AC OCP (AC over current protection)	Err9	GRID indicator red on	Intermittent beeps	Check if the load actual power exceeds the rated power (i.e. the Energy Storage System's continuous output power), disconnect the load completely and turn off the Energy Storage System, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
3	AC UVP (AC under voltage protection)	Err25	GRID indicator red on	--	

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
4	AC PRECHG OUT (AC pre-charge timeout)	Err28	GRID indicator green on	--	Disconnect the AC input completely and turn off the Energy Storage System. Wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
5	AC RELAY Adhesion (AC relay adhesion. i.e. AC relay abnormal)	Err29			
6	AC FREQ ERR (AC frequency error)	Err31	GRID indicator red on	Intermittent beeps	

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will go off when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not go off.

7.5 Load faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	LAOD CURR OFFSET ERR (Load current offset error)	Err33	--	--	Disconnect the load completely and turn off the Energy Storage System, wait for 5 minutes and then turn on the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
2	OVERLOAD (Overload)	Err48	LOAD indicator red on	Intermittent beeps	
3	OVERLOAD LOCK (Overload lock)	Err55			

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will go off when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not go off.

7.6 Other faults for single Energy Storage System

No.	Fault/Status	Error code①	Indicator	Buzzer	Solution
1	BUS OVP (DC bus over voltage protection)	Err0	--	--	Disconnect the Energy Storage System completely. Wait for 5 minutes and turn off the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
2	BUS UVP (DC bus under voltage protection)	Err6			
3	AMBIENT OTP (Ambient over temperature protection)	Err12			Ensure the Energy Storage System is installed in a cool and well-ventilated place.
4	HARD OVP (Hardware over voltage protection)	Err21			Disconnect the Energy Storage System completely. Wait for 5 minutes and turn off the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
5	BAT CHG OCP (Battery charge over current protection)	Err24			
6	CHG CURR OFFSET ERR (Charge current offset error)	Err36			

No.	Fault/Status	Error code①	Indicator	Buzzer	Solution
7	PUSH DRV ERR (Push driver error)	Err38	--	--	Disconnect the Energy Storage System completely. Wait for 5 minutes and turn off the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.
8	APS ERR (Auxiliary power supply error)	Err40			
9	ATS NC (Ambient temperature sensor no connection)	Err42			
10	LIMITCHG (Low temperature limit charging)	Err46			Check whether the ambient temperature is lower than the set "Charge low temperature limit" and "Discharge low temperature limit."
11	LIMITDISCHG (Low temperature limit discharging)	Err47			
12	EEP ERR (EEPROM error)	Err54			Disconnect the Energy Storage System completely. Wait for 5 minutes and turn off the Energy Storage System to check if it resumes normal operation. If it is still abnormal, please contact our technical support.

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

7.7 BMS communication faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	BMS OVP (BMS over voltage protection)	Err66	--	Intermittent beeps	Check the BMS communication status or BMS setting parameters.
2	BMS Chage TEMP ERR (BMS charge temperature error)	Err68			
3	BMS UVP (BMS under voltage protection)	Err69			
4	BMS DisChageTEMP ER (BMS discharge temperature error)	Err71			
5	BMS communication faults	Err74			

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will go off when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not go off.

8 Maintenance

To maintain long-term working performance, it is recommended to have the following items inspected twice a year.

- Make sure the airflow around the Energy Storage System is not blocked and remove dirt or debris from the fan.
- Check whether the exposed wires have been damaged by sunlight, friction with other surrounding objects, dryness, insects or rodents, etc., repair or replace the wires if necessary.
- Verify whether the indicator and display are consistent with the actual operation of the Energy Storage System, and note that corrective action should be taken in case of inconsistency or error.
- Check terminals for signs of corrosion, insulation damage, high temperature or burning/discoloration, tighten terminal screws.
- Check for signs of dirt, insect nesting and corrosion and clean up as required.
- This Energy Storage System is not equipped with a lightning arrester, if it is equipped with a failed lightning arrester, replace the failed lightning arrester in time to avoid lightning strikes' damage to the Energy Storage System or even other equipment.

 **WARNING**	Risk of electric shock! Make sure that the power supply of the Energy Storage System is disconnected when performing the above operations, and wait for 10 minutes for the power in the capacitor to be discharged before performing the corresponding checks or operations!

9 Specifications

Model		ROH5542H-05X1P20	ROH5542H-10X2P20
Utility input	Utility Voltage	176VAC to 264VAC (Default), 90VAC to 280VAC (Configurable)	
	Utility Frequency	45Hz to 65Hz	
	Maximum Utility Charging Current	100A	
	Switch Response Time	Switch Response Time–Inverter to Utility: 10ms Switch Response Time–Utility to Inverter (when the load power is higher than 100W): 20ms	
Inverter output	Inverter Rated Power (@35°C)	5,500W	
	3-second Transient Surge Output Power	8,500W	
	Inverter Output Voltage	220/230VAC±3%	
	Inverter Frequency	50/60Hz±0.2%	
	Output Voltage Waveform	Pure sine wave	
	Load Power Factor	0.2–1(VA ≤ Rated output power)	
	THDu (Total Harmonic Voltage Distortion)	≤ 3% (48V resistive load)	
	Maximum Load Efficiency	92%	
	Maximum Inverter Efficiency	94%	
Solar controller	PV Maximum Open-circuit Voltage	500V (At the lowest operating environment temperature) 440V (At 25℃)	
	MPPT Voltage Range	85VDC to 400VDC	
	MPPT Input Channels	2 ways	
	PV Maximum Input Current	2 ways, 2*15A	
	PV Maximum Input Power	2*3,000W	

	PV Maximum Charging Current	100A	
	MPPT Maximum Efficiency	≥ 99.5%	
Battery	Battery Type	LFP	
	Battery Pack	5.12KWH, 51.2V/100AH	
	Battery Pack Quantity	1	2
	Battery Rated Voltage	51.2VDC	
	Battery Energy	5.12KWH	10.24KWH
	Battery Work Temperature Range	Charging: 0℃ to +50℃, discharging：-20℃ to +50℃	
Others	No-load Losses	<1.0 A (Test condition: Utility, PV and Load are not connected, AC output is ON, fan stops, @48V input)	
	Standby Current	<0.15A (Test condition: Utility, PV and Load are not connected, AC output is OFF, fan stops, @48V input)	
	Installation Method	Wall-mounted stacking (stack first and then fix it on the wall)	
Environment parameters	Work Temperature Range	-20℃ to +50℃ (When the environment temperature exceeds 30℃, the actual output power is reduced appropriately)	
	Storage Temperature Range	-25℃ to +60℃	
	Enclosure	IP20	
	Relative Humidity	< 95% (N.C.)	
	Altitude	<4,000M (If the altitude exceeds 2,000 meters, the actual output power is reduced appropriately)	
Mechanical parameters	Dimension (Length x Width x Height)	665mm*160mm*833mm	665mm*160mm*1,236mm
	Converter Net Weight	19.8kg	19.8kg
	Total Net Weight	74.4kg (Fixed Bracket)	122.8kg (Fixed Bracket)

Model		ROH5542H-15X3P20	ROH5542H-20X4P20
Utility input	Utility Voltage	176VAC to 264VAC (Default), 90VAC to 280VAC (Configurable)	
	Utility Frequency	45Hz to 65Hz	
	Maximum Utility Charging Current	100A	
	Switch Response Time	Switch Response Time–Inverter to Utility: 10ms Switch Response Time–Utility to Inverter (when the load power is higher than 100W): 20ms	
Inverter output	Inverter Rated Power (@35°C)	5,500W	
	3-second Transient Surge Output Power	8,500W	
	Inverter Output Voltage	220/230VAC±3%	
	Inverter Frequency	50/60Hz±0.2%	
	Output Voltage Waveform	Pure sine wave	
	Load Power Factor	0.2–1(VA ≤ Rated output power)	
	THDu (Total Harmonic Voltage Distortion)	≤ 3% (48V resistive load)	
	Maximum Load Efficiency	92%	
	Maximum Inverter Efficiency	94%	
Solar controller	PV Maximum Open-circuit Voltage	500V (At the lowest operating environment temperature) 440V (At 25℃)	
	MPPT Voltage Range	85VDC to 400VDC	
	MPPT Input Channels	2 ways	
	PV Maximum Input Current	2 ways, 2*15A	
	PV Maximum Input Power	2*3,000W	
	PV Maximum Charging Current	100A	

	MPPT Maximum Efficiency	≥ 99.5%	
Battery	Battery Type	LFP	
	Battery Pack	5.12KWH, 51.2V/100AH	
	Battery Pack Quantity	3	4
	Battery Rated Voltage	51.2VDC	
	Battery Energy	15.36KWH	20.48KWH
	Battery Work Temperature Range	Charging: 0℃ to +50℃, discharging：-20℃ to +50℃	
Others	No-load Losses	< 1.0 A (Test condition: Utility, PV and Load are not connected, AC output is ON, fan stops, @48V input)	
	Standby Current	< 0.15A (Test condition: Utility, PV and Load are not connected, AC output is OFF, fan stops, @48V input)	
	Installation Method	Wall-mounted stacking (stack first and then fix it on the wall)	
Environment parameters	Work Temperature Range	-20℃ to +50℃ (When the environment temperature exceeds 30℃, the actual output power is reduced appropriately)	
	Storage Temperature Range	-25℃ to +60℃	
	Enclosure	IP20	
	Relative Humidity	< 95% (N.C.)	
	Altitude	<4,000M (If the altitude exceeds 2,000 meters, the actual output power is reduced appropriately)	
Mechanical parameters	Dimension (Length x Width x Height)	665mm*160mm*1,639mm	665mm*160mm*2,042mm
	Converter Net Weight	19.8kg	19.8kg
	Total Net Weight	171.2Kg (Fixed Bracket)	219.6Kg (Fixed Bracket)

Model		ROH5542H-25X5P20	ROH5542H-30X6P20
Utility input	Utility Voltage	176VAC to 264VAC (Default), 90VAC to 280VAC (Configurable)	
	Utility Frequency	45Hz to 65Hz	
	Maximum Utility Charging Current	100A	
	Switch Response Time	Switch Response Time–Inverter to Utility: 10ms Switch Response Time–Utility to Inverter (when the load power is higher than 100W): 20ms	
Inverter output	Inverter Rated Power (@35°C)	5,500W	
	3-second Transient Surge Output Power	8,500W	
	Inverter Output Voltage	220/230VAC±3%	
	Inverter Frequency	50/60Hz±0.2%	
	Output Voltage Waveform	Pure sine wave	
	Load Power Factor	0.2–1(VA ≤ Rated output power)	
	THDu (Total Harmonic Voltage Distortion)	≤ 3% (48V resistive load)	
	Maximum Load Efficiency	92%	
	Maximum Inverter Efficiency	94%	
Solar controller	PV Maximum Open-circuit Voltage	500V (At the lowest operating environment temperature) 440V (At 25℃)	
	MPPT Voltage Range	85VDC to 400VDC	
	MPPT Input Channels	2 ways	
	PV Maximum Input Current	2 ways, 2*15A	
	PV Maximum Input Power	2*3,000W	
	PV Maximum Charging Current	100A	
	MPPT Maximum Efficiency	≥ 99.5%	

Battery	Battery Type	LFP	
	Battery Pack	5.12KWH, 51.2V/100AH	
	Battery Pack Quantity	5	6
	Battery Rated Voltage	51.2VDC	
	Battery Energy	25.6KWH	30.72KWH
	Battery Work Temperature Range	Charging: 0℃ to +50℃, discharging：-20℃ to +50℃	
Others	No-load Losses	< 1.0 A (Test condition: Utility, PV and Load are not connected, AC output is ON, fan stops, @48V input)	
	Standby Current	< 0.15A (Test condition: Utility, PV and Load are not connected, AC output is OFF, fan stops, @48V input)	
	Installation Method	Wall-mounted stacking (stack first and then fix it on the wall)	
Environment parameters	Work Temperature Range	-20℃ to +50℃ (When the environment temperature exceeds 30℃, the actual output power is reduced appropriately)	
	Storage Temperature Range	-25℃ to +60℃	
	Enclosure	IP20	
	Relative Humidity	< 95% (N.C.)	
	Altitude	<4,000M (If the altitude exceeds 2,000 meters, the actual output power is reduced appropriately)	
Mechanical parameters	Dimension (Length x Width x Height)	665mm*160mm*2,445mm	665mm*160mm*2,848mm
	Converter Net Weight	19.8kg	19.8kg
	Total Net Weight	268.0kg (Fixed Bracket)	316.4kg (Fixed Bracket)

Any changes without prior notice!

Version number: V10

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